MINERAL LAND CLASSIFICATION OF THE EUREKA-SALINE VALLEY AREA, INYO AND MONO COUNTIES, CALIFORNIA

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SPECIAL REPORT 166

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SPECIAL REPORT 166

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MINERAL LAND CLASSIFCATION OF THE EUREKA-SALINE VALLEY AREA

Includes
Blanco Mountain, Dry Mountain, Last Chance Range, Magruder Mountain, Marble Canyon, Mt. Barcroft, New York Peak, Piper Peak, Soldier Pass, Ubehebe Crater, Ubehebe Peak, Waucoba Mountain, Waucoba Spring, and Waucoba Wash 15-Minute Quadrangles, Inyo and Mono Counties, California

1992

By

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PREFACE

The California Surface Mining and Reclamation Act of 1975 (SMARA) requires the State Geologist to classify land according to the presence, absence, or likely occurrence of significant mineral deposits in certain areas of the state. This Special Report is one of a series of mineral land classification studies being conducted in the California Desert region by the California Division of Mines and Geology. The information is provided to the State Mining and Geology Board for transmittal to local governments and federal agencies who regulate land use in this region.

EXECUTIVE SUMMARY

The California Surface Mining and Reclamation Act of 1975 requires the State Geologist to classify land according to the presence, absence, or likely occurrence of significant mineral deposits in certain areas of the State subject to urban expansion or other irreversible land uses incompatible with mining. The primary objective of mineral land classification is to ensure the mineral potential of land is recognized and considered before land-use decisions which could preclude mining are made.

This report includes geologic maps of the Blanco Mountain, Dry Mountain, Last Chance Range, Magruder Mountain, Marble Canyon, Mt. Barcroft, New York Peak, Piper Peak, Soldier Pass, Ubehebe Crater, Ubehebe Peak, Waucoba Mountain, Waucoba Spring, and Waucoba Wash 15-minute quadrangles (Plates 1A and 1B), and Mineral Land Classification maps which display the location of specific types of mineral deposits (Plates 2A, 2B, 3A and 3B). Summary descriptions of areas classified MRZ-2 and MRZ-3 are presented on Tables 1-4. Sand, gravel, and common rock resources are not considered in this report.

MAJOR FINDINGS

- The most significant mineral deposits known to exist within the study area are those formed by hydrothermal processes from which the industrial mineral talc is currently being produced. Additionally, production of moderate to minor amounts of gold, silver, lead, zinc, copper, mercury, sulfur, tungsten, wollastonite, and salines has occurred in past years from hydrothermal, contact metasomatic and evaporite deposits.

- The White Eagle Talc mine, currently under operation by Okuniewicz Mining Company, is producing steatite-grade talc and has been classified MRZ-2a$^{(Talc\text{-}2)}$. Measured reserves are minimal; however, indicated reserves are moderate for the property.

- A deposit of sulfur at the Crater mine, inactive since 1965, with probable reserves in excess of 3 million tons averaging 40 percent sulfur has been classified MRZ-2a$^{(Sulfur\text{-}2)}$.

- The area lying along the eastern side of the Inyo Mountains has been identified as containing significant inferred resources of lode gold and silver is classified MRZ-2b$^{(h\text{-}1)}$. The gold, along with associated silver, copper, lead, and zinc, typically is present in small, but rich pockets in hydrothermally formed quartz veins that occupy faults, fissures, and joints which cut granitic rocks; whereas the silver-bearing veins are mainly in calcareous, dolomitic sedimentary rocks that were fractured, deformed, and metamorphosed by granitic rocks, or mafic dikes. The U.S. Bureau of Mines has identified gold and silver properties within this area that contain about 4.4 million tons of inferred gold reserves and 280,000 tons of silver resources. The gold veins identified contain about 1.1 million ounces of gold and 3.2 million ounces of silver, and the silver veins contain an additional 2 million ounces of silver for a total worth exceeding $570 million at current precious metal prices of $485/oz for gold and $7.00/oz for silver.

- A narrow zone, which follows the igneous-metasedimentary contact zone along the eastern escarpment of the Inyo Mountains, encompasses the Snow-flake, Dorris Dee, Grey Eagle, White Eagle MRZ-2a$^{(Talc\text{-}2)}$ and Willow Creek talc mines is classified MRZ-2b$^{(Talc\text{-}5)}$. All of these mines contain inferred talc reserves, and it is likely additional development and/or drilling at these properties would upgrade the classification to MRZ-2a.

- The area of the perennial salt lake and adjacent playa located along the southwestern edge of Saline Valley, classified MRZ-2b$^{(Na,Bo,K)}$ for saline minerals supported production of borates and salt from 1895 intermittently through the 1950's. Indicated reserves of salt (NaCl) and thenardite (Na_2SO_4) contained within playa sediments are extensive.

- The northern flank of Hunter Mountain is underlain in part by a sequence of Paleozoic age metasedimentary rocks that have been identified as containing significant inferred reserves of wollastonite. The J.O. or Calmet property, intermittently mined during the 1960's, has inferred reserves exceeding 25 million tons of wollastonite and is classified MRZ-2b$^{(Wollastonite\text{-}1)}$.

- An area in the central part of the Last Chance Range, centered around the Crater sulfur mine, MRZ-2a$^{(Sulfur\text{-}1)}$ and the El Capitan mercury mine, MRZ-2b$^{(h\text{-}4)}$ has been classified MRZ-2b$^{(h\text{-}3)}$ for inferred epithermal gold deposits associated with a late Tertiary age hydrothermal system.

- The area around Cerro Gordo Peak has been classified MRZ-2b (h-3) for hydrothermally formed metallic deposits. This area encompasses the historic Cerro Gordo mining district which was the site of a silver bonanza between 1869 to 1876 and a subsequent revival with the production of high grade zinc carbonate during 1911 to 1919. Although currently inactive, indicated reserves of argentiferous galena exist in the old workings and an ongoing drilling program may upgrade the classification to MRZ-2a for gold.

Five wilderness study areas (WSAs) which encompass approximately 70 percent of the Eureka-Saline study area are currently being considered for inclusion into the National Wilderness System. Information gathered during the course of this Mineral Land Classification study has revealed that favorable terrains for significant mineral deposits exist within these proposed wilderness areas. These deposits have been ranked below in order of potential economic importance.

The Inyo Mountains WSA, encompassing the historic Beveridge Mining District, has been identified by the U.S. Bureau of Mines as containing gold and silver properties that, on a conservative basis, have an inferred 4.4 million tons of gold reserves and 280,000 tons of silver resources that contain 1.1 million ounces of gold and 3.2 million ounces of silver. In addition, an estimated 640,000 tons of steatite-grade talc occurring in two zones has been identified as existing within this WSA.

The Saline Valley WSA, southward along the crest of the Last Chance Range from the Crater Sulfur mine, encompasses an area deemed favorable for hosting epithermal gold and/or mercury mineralization.

The Little Sand Spring WSA, within the area southward from the Sylvia mine, has been classified as hosting potential epithermal gold mineralization.

The Hunter Mountain WSA, underlain in part by a metasedimentary-igneous contact zone that extends into the Death Valley National Monument, contains an inferred reserve of 26 million tons of wollastonite.

The study area should be periodically re-evaluated and the classification maps updated as necessary in order to take into account any new discoveries of mineral deposits, as well as allowing for changes in technology, economic conditions, and geologic concepts that would have a bearing on assessing the significance of mineral resources that may be present. All of the areas classified as MRZ-3a are favorable target areas for mineral exploration. Consequently, we can expect that mineral discoveries will be made as a result of further exploration within some of them. The MRZ-3a areas should be given special consideration at the time that the classification information is incorporated in the general plans.

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PART I - MINERAL LAND CLASSIFICATION PROJECT DESCRIPTION

INTRODUCTION

Local, State, and federal agencies are faced with lifficult land-use decisions as competition for land for a ariety of purposes increases. Since the availability of nineral resources is vital to our society, it is essential hat mineral potential of land be considered in the land ise planning process. The California Surface Mining ind Reclamation Act of 1975 requires the State Geologist to classify land according to the presence, absence, or likely occurrence of significant mineral deposits in ertain areas of the state. This information is provided inder policies of the California State Mining and Geology Board (the Board) (1983). The Board transmits the nineral land classification information to appropriate ead agencies that are required to incorporate it in their general land-use plans. The primary objective of mineral land classification is to assure that the mineral resource potential of land is recognized and considered before land-use decisions that could preclude mining are made.

CLASSIFICATION PROCEDURES

Data Gathering and Assessment

The California Desert region is one of several geographic regions in California to be selected for non-urban SMARA mineral land classification studies (Figure 1). This study covers the Blanco Mountain, Dry Mountain, Last Chance Range, Magruder Mountain, Marble Canyon, Mt. Barcroft, New York Butte, Piper Peak, Soldier Pass, Ubehebe Crater, Ubehebe Peak, Waucoba Mountain, Waucoba Spring, and Waucoba Wash 15-minute quadrangles which are located in the northeastern California Desert region (Figure 2). The study included research of geologic and mining related literature, compilation of geologic maps, and plotting of reported mines and prospects using publications and mine data of the Division of Mines and Geology, U.S. Geological Survey, U.S. Bureau of Mines and the Bureau of Land Management. It included a field work phase which involved a site investigation of many of the known mines and mineral prospects, limited sampling of rocks for chemical analyses, geophysical surveys, and some geologic mapping. This data was assessed in order to identify the geologic factors which control or influence mineralization.

The field and analytical data were integrated and evaluated for assigning Mineral Resource Zones (MRZ's) to areas in accordance with mineral land classification guidelines adopted by the California State Mining and Geology Board (1983). A geologic map (scale 1:62,500) and mineral land classification maps (scale 1:62,500) were prepared and are included in this report (Plates 1-3). The maps also show mine and prospect localities. Mines and prospect descriptions are presented in Appendix B.

The California Mineral Land Classification System

The State Geologist, in consultation with the State Mining and Geology Board, has adapted Mineral Resource Zone (MRZ) nomenclature and criteria to what is referred to as the California Mineral Land Classification Diagram (Figure 3). The diagram is a modification of a mineral resource classification diagram developed by the U.S. Bureau of Mines and the U.S. Geological Survey (1980) that has become a standard reference to present the relationship between the knowledge of mineral deposits and their economic characteristics. Definitions of terms used in the diagram are presented in Appendix B.

The horizontal axis of the diagram relates the degree of knowledge about mineral resource occurrence while the vertical axis relates economic characteristics of the deposits. The two major divisions on the diagram are "Identified Resources" (MRZ-2) and "Undiscovered Resources" (MRZ-3). Areas classified as MRZ-2 contain identified mineral resources and areas classified as MRZ-3 may contain undiscovered mineral resources.

Mineral Resource Zone (MRZ) Categories

Mineral Resource Zone (MRZ) categories set forth in the guidelines established by the State Mining and Geology Board have been adapted to the California Mineral Land Classification Diagram (Figure 3). These adaptations are presented below:

MRZ-1: Areas where available geologic information indicates there is little likelihood for the presence of mineral resources.

MRZ-2a: Areas that contain significant measured or indicated reserves.

MRZ-2b: Areas where geologic information indicates that significant inferred resources or demonstrated sub-economic resources are present.

MRZ-3a: Areas likely to contain undiscovered mineral deposits similar to known deposits in the same producing district or region (hypothetical resources).

MRZ-3b: Areas judged to be favorable geologic environments for mineral resource occurrence, but where mineral discoveries have not been made in the region (speculative resources).

MRZ-4: Areas where geologic information does not rule out either the presence or absence of mineral resources.

Mineral land classification addresses specific types of mineral deposits which occur, or are likely to occur, in the project area. The type of mineral deposit for which a particular area is classified is denoted by a superscript letter following the assigned MRZ category (e.g. MRZ-2b$^{(h)}$ for deposits formed by hydrothermal processes). Also, superscript reference numbers are used to identify specific MRZ areas discussed in the report (e.g. MRZ-2b$^{(h-2)}$).

Figure 1. Map of California showing urban and non-urban areas of the state subject to mineral land classification

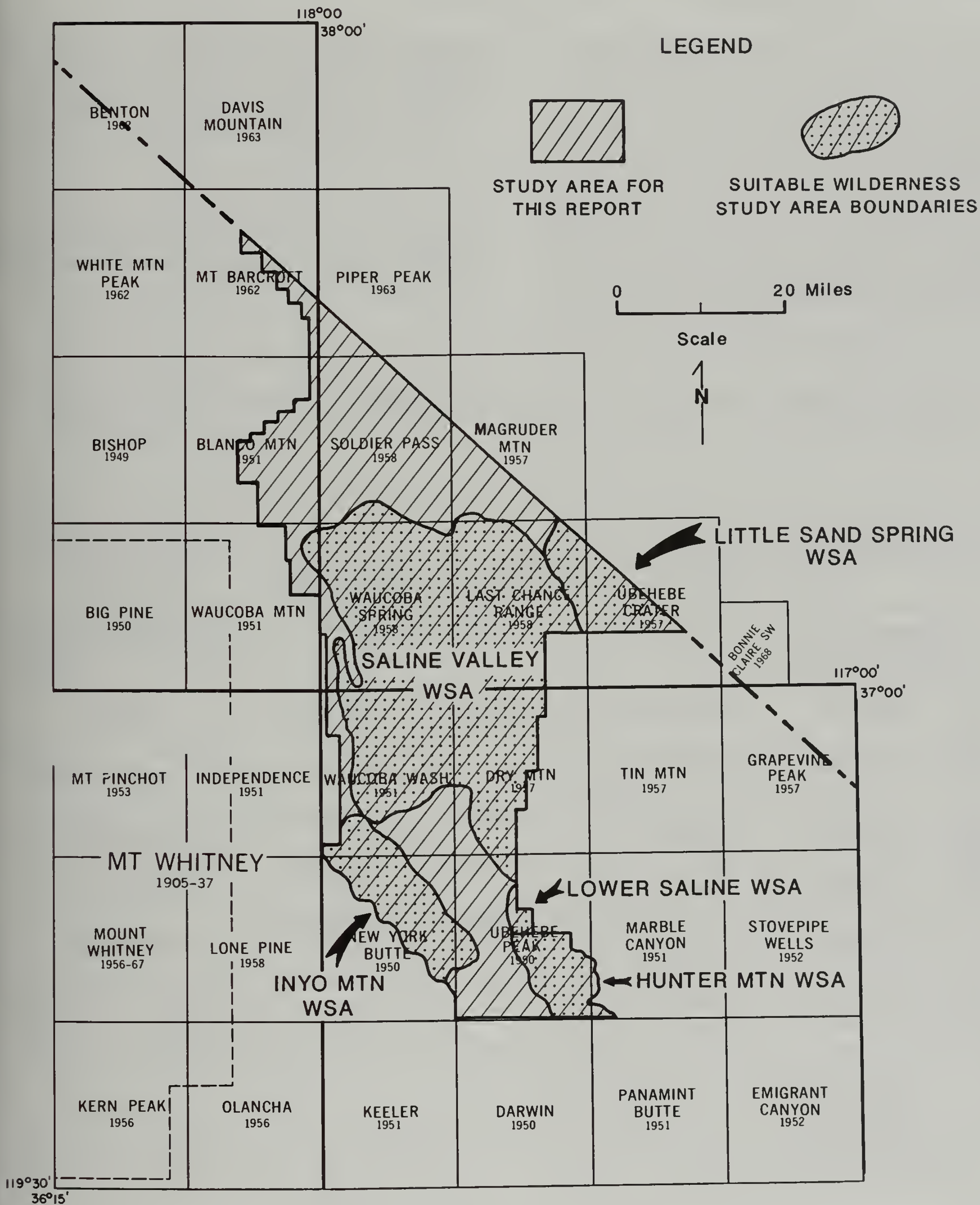

Figure 2. Index map of 15-minute quadrangles and wilderness study areas within the Eureka-Saline Valley SMARA study area.

SUMMARY OF MINERAL RESOURCE ZONE ASSIGNMENTS

Assignment of mineral resource zones is based on a geologic and mineral resource survey which was conducted during the course of this study (see Parts II and III). As discussed in Part III, the survey indicates that four types of mineral deposits are present, or are likely to be present, in the study area. These are: (1) deposits formed by hydrothermal processes which contain base and precious metals (denoted by the superscript letter "h"); (2) deposits formed by contact metasomatism (skarns) which contain tungsten, copper and associated metals (denoted by the superscript letter "s"); (3) deposits formed by mechanical concentration of mineral particles from weathered debris which contain placer gold (denoted by the superscript "p"); and (4) deposits of industrial minerals formed by hydrothermal, contact metasomatism, evaporite, sedimentary and eolian processes which include sulfur, salts, talc, limestone, sand, pumice and wollastonite.

Individual areas classified as MRZ-2a, 2b and MRZ-3a, 3b with respect to the above types of deposits are presented on Plates 2-3 and described in detail in the *Mineral Resource Assessment* section of this report (Part III). For convenience, these areas are summarized in tabulated form on Table 1, which follows.

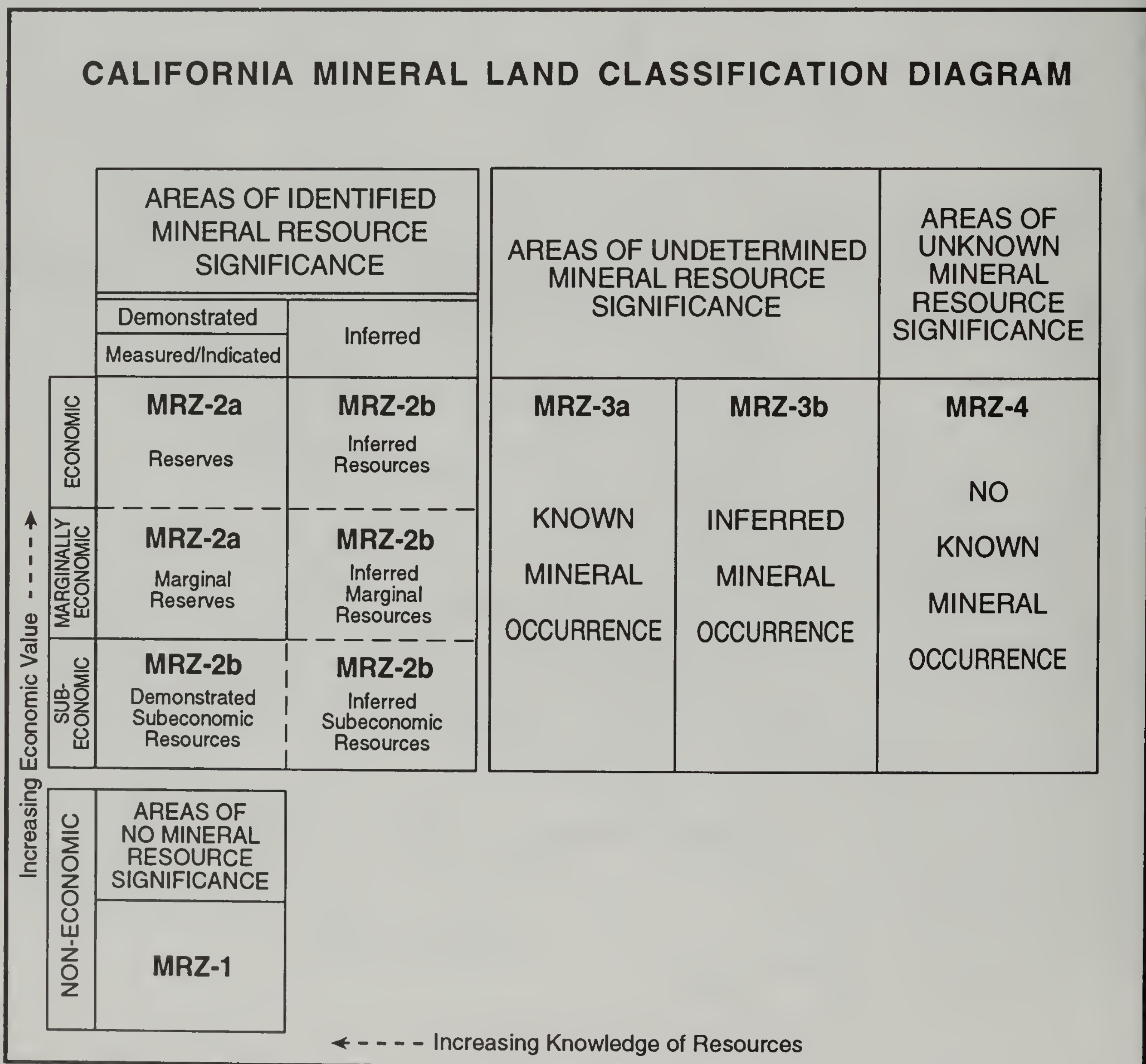

Figure 3. California mineral land classification diagram: Diagrammatic relationship of mineral resource zone catergories to the resource/ reserve classification system. See Appendix B for explanation of nomenclature.

[T]ABLE 1. SUMMARY LISTING OF AREAS CLASSIFIED MRZ-2 AND MRZ-3 FOR DEPOSITS FORMED BY HYDROTHERMAL PROCESSES.
(See Plates 2a and 2b)

[R]ESOURCE ZONE	NAME/VICINITY	RESERVES/RESOURCES	SUPPORTING EVIDENCE FOR MRZ ASSIGNMENT**
MRZ-2b (h-1) (Plate 2b)	Eastern Inyo Mountain area	Inferred lode gold resources	Historic gold production has occurred in an extensive area form mines located along a series of generally north trending quartz veins of the Beveridge District. Geologic evidence suggests that eight out of thirty mines contain inferred resources of over 1.1 million ounces of gold and 5.2 million ounces of silver.
MRZ-2b (h-2) (Plate 2b)	Cerro Gordo Mine area	Inferred silver, lead and zinc resources	Historic silver, lead, and zinc production has occurred in the area from mines located in fractured and faulted limestone. Geologic evidence suggests that additional significant silver, lead, and zinc, as well as gold resources exist.
MRZ-2b (h-3) (Plate 2a)	Last Chance Range area	Inferred disseminated gold resources	Historic production of sulfur and mercury from a hot springs system that is consistant with typical hot springs gold mineralization. Geochemical sampling by two private exploration companies has delineated two areas possessing gold mineralization within this area.
MRZ-2b (h-4) (Plate 2a)	El Capitan Mercury Mine area	Inferred mercury resources	Historic mercury production has occurred in a breccia pipe that has cinnabar, gypsum, sulfur, and quartz typical of a hot springs type environment. Geologic evidence suggests significant mercury resources exist.
MRZ-2b (h-5) (Plate 2a)	Alum Canyon-Ace Hills area	Inferred molybdenum resources	Area has been explored and drilled for a porphyry-type molybdenum deposits. Based on proprietary data, the BLM has reported that there is 1.6 billion pounds of molybdenum resource within this area.
MRZ-2b (h-6) (Plate 2a)	Loretto Mine area	Inferred copper resource	Historic copper production has occurred in the area from northeast trending quartz veins. Geologic evidence suggests additional significant copper resources exist.
MRZ-3a (h-1) (Plate 2a)	Last Chance Range area	Moderate to high potential for the presence of undiscovered mercury resources	Some minor mercury production has occurred form several mines within an elliptical-shaped area in the Last Chance Range. The cinnabar and metacinnabar are present in fault zones and shears within siltstones and quartzites and most samples reveal the presence of gold. Other areas of localized lode gold mineralization are likely to exist.
MRZ-3a (h-2) (Plate 2a)	Leah-Vanessa and Jenny B. Prospect area	Moderate to low potential for the presence of resources	Geologic mapping defines a regional-scale structural zone (Last Chance thrust fault) along which localized gold mineralization has occurred. Several mines within this zone have yielded significant gold values. Other areas of localized gold mineralization are likely to exist.
MRZ-3a (h-3) (Plate 2a)	Sugarloaf Mountain area	Low to moderate potential for the presence of undiscovered gold and silver resources	Geologic mapping defines a 7,000 ft. long structural zone along which localized gold and silver mineralization has occurred. Other areas of localized gold and silver mineralization are likely to exist.

TABLE 1. cont.

RESOURCE ZONE	NAME/VICINITY	RESERVES/RESOURCES	SUPPORTING EVIDENCE FOR MRZ ASSIGNMENT**
MRZ-3a (h-4) (Plate 2a)	West Deep Springs Valley and Indian Garden Creek	Moderate to low potential for presence of undiscovered lead-silver and gold resources	South of Cottonwood Canyon all prospects and mines are located on quartz veins in the Beer Creek quartz monzonite and contain silver along with small amounts of gold. The Lincoln mine is the richest with reported values of 100 oz of silver per ton. North of Cottonwood Canyon pyrite and gold dominate over galena and silver in the northwest to west trending shears and veins . Other areas of localized lead-silver and gold mineralization are likely to exist.
MRZ-3a (h-5) (Plate 2a)	Whippoorwill-Jackass Flats area	Moderate to low potential for presence of undiscovered lead-zinc-silver resources	Some lead-zinc-silver production has occurred from several mines located on north to northeast trending quartz veins that contain argentiferous galena. Other areas of localized lead-zinc-silver mineralization are likely to exist.
MRZ-3a (h-6) (Plate 2a)	Last Chance Spring area	Low to moderate potential for presence of undiscovered lead-silver and gold resources	Geologic mapping defines a regional-scale zone along which localized lead-silver and gold mineralization has occurred. Other areas of localized lead-silver and gold mineralization are likely to exist.
MRZ-3a (h-7) (Plate 2a)	Willow Spring area	Low to moderate potential for presence of undiscovered lead-silver and gold resources	Geologic mapping defines a zone of northwest to northeast trending shear zones and veins along which localized lead-silver and gold mineralization has occurred. Other areas of localized lead-silver and gold mineralization are likely to exist.
MRZ-3a (h-8) (Plate 2a)	Lower Alum Creek	Low to moderate potential for presence of undiscovered gold resources	Geologic mapping defines a regional-scale zone along which quartz and pyrite occur in volcanic tuffs. Areas within this zone are likely to contain gold mineralization.
MRZ-3a (h-9) (Plate 2a)	Nelson Range area	Low to moderate potential for presence of undiscovered copper and lead resources	Some copper production has occurred from several mines located along the contact between limestone and quartz monzonite, which trends northeast. Other areas of localized copper and lead mineralization are likely to exist in this area.
MRZ-3a (h-10) (Plate 2a)	Copper Canyon area	Low to moderate potential for presence of undiscovered gold resources	Geologic mapping defines a northwest trending shear zone that contains pyrite and quartz with some gold mineralization. Other areas of localized gold mineralization are likely to exist.
MRZ-3a (h-11) (Plate 2a)	Soldier Canyon area	Moderate to high potential for presence of undiscovered gold and silver resources	Geologic mapping defines a northeast trending quartz vein in quartz monzonite that contains gold and silver mineralization. Several mines located along the vein contain high-grade silver and gold. Other areas of localized gold and silver mineralization are likely to exist.

TABLE 1. cont.

RESOURCE ZONE	NAME/VICINITY	RESERVES/RESOURCES	SUPPORTING EVIDENCE FOR MRZ ASSIGNMENT**
MRZ-3a (h-12) (Plate 2a)	Juanita Prospect area	Moderate to high potential for presence of undiscovered gold resources	Geologic mapping defines a regional-scale structural zone containing evidence of localized hydrothermal alteration of country rock. Geochemical sampling of prospects indicate that the area contains disseminated gold mineralization. Other areas of disseminated gold mineralization are likely to exist.
MRZ-3a (h-13) (Plate 2B)	Upper Warm Spring area	Low to moderate potential for presence of manganese, tungsten, and silver	Geologic mapping defines a zone of mineral spring deposits that contain manganese, tungsten, and silver mineralization. Other areas of localized manganese, tungsten, and silver mineralization are likely to exist within this area.
MRZ-3a (h-13) (Plate 2b)	Rainbow-Caljemp Prospect	Low to moderate potential for presence of undiscovered gold resources	Probable production of small amounts of gold from historic mining in the area and evidence of hydrothermal alteration of the country rock indicate the area is likely to contain deposits of precious metals localized along faults and fractures.
MRZ-3a (h-14) (Plate 2a)	AJA Tungsten Prospect	Low potential for presence of undiscovered tungsten resources	Geologic mapping defines a zone of alteration along which localized tungsten mineralization has occurred. Other areas of localized tungsten mineralization are likely to exist.
MRZ-3a (h-16) (Plate 2a)	Sylvia Mine area	Moderate to high potential for presence of undiscovered base and precious metal resources	Limited base and precious metal production form historic mining activity, evidence of hydrothermal alteration of the country rock, and geochemical sampling of mines and prospects indicate the area is likely to contain deposits of base and precious metals localized along small, north trending faults in Wyman Formation and quartz monzonite.
MRZ-3a (h-17) (Plate 2b)	Spanish Spring area	Moderate to high potential for presence of undiscovered precious metal resources	Limited precious metal production from historic mining activity, evidence of hydrothermal alteration of the country rock, and geochemical sampling of mines and prospects indicate the area is likely to contain deposits of precious metals along northwest trending veins of quartz.
MRZ-3a (h-18) (Plate 2b)	Lead Canyon area	Moderate to high potential for presence of undiscovered base and precious metal resources	Limited base and precious metal production from historic mining activity and evidence of hydrothermal alteration of the country rock indicate the area is likely to contain deposits of base and precious metals along faults and shear zones in Cambrian dolomite.
MRZ-3a (n-19) (Plate 2a)	Mineral Hill and Iron Age area	Moderate to low potential presence of undiscovered base and precious metal resources	Limited base and precious metal production from historic mining activity and evidence of hydrothermal alteration of the country rock indicate the area is likely to contain deposits of base and precious metals along northeast trending faults and shears in altered pre-Cambrian and Cambrian dolomite.

TABLE 1. cont.

RESOURCE ZONE	NAME/VICINITY	RESERVES/RESOURCES	SUPPORTING EVIDENCE FOR MRZ ASSIGNMENT**
MRZ-3b (h-1) (Plate 2a)	Dry Mountain area	Speculative Resources	Area identified as possibly containing deposits of precious metals by Landsat imagery as having iron oxide of possible hydrothermal origin, an anomalous geochemical suite, and hydrothermal alteration of the country rock.
MRZ-3b (h-2) (Plate 2a)	Southern Dry Mountain area	Speculative Resources	Evidence of hydrothermal alteration of country rock, geophysical data, and geochemical sampling of veins and stream sediments indicate this area may contain deposits of base metals associated with a porphyry-type system.
MRZ-3b (h-3) (Plate 2a)	Central Last Chance Range	Speculative Resources	Landsat imagery and geochemical sampling suggests that these areas may contain base or precious metals in a hydrothermal system.
MRZ-3b (h-4) (Plate 2a)	Saline Range area	Speculative Resources	Landsat imagery and geochemical sampling suggests that these areas may contain base or precious metals.
MRZ-3b (h-5) (Plate 2a)	Jackass Canyon area	Speculative Resources	Remote sensing and geochemical sampling suggests that these areas may contain precious metals.
MRZ-3b (h-6) (Plate 2a)	Lower Warm Spring area	Speculative Resources	Geologic mapping defines a series of springs that may contain base metals.
MRZ-3b (h-7) (Plate 2a)	West side of Eureka Valley	Speculative Resources	NURE airborne gamma-ray data defines this small area of anomalous uranium and thorium.
MRZ-3b (h-8) (Plate 2a)	Cucomongo-Sylvania Canyon area	Speculative Resources	Geologic mapping which defines an area of skarn mineralization and adjoining areas of scheelite production suggest that this area may contain scheelite as well.
MRZ-3b (h-9) (Plate 2a)	Sylvia Mine area	Speculative Resources	Geologic mapping, evidence of hydrothermal alteration, and geochemical sampling of veins and streams sediments indicate that this area may contain a molybdenum stockwork deposit.
MRZ-3b (h-10) (Plate 2b)	Southern Saline Range area	Speculative Resources	Geologic mapping defines an area of numerous faults that contains an exposure of the Last Chance thrust fault, which suggests that this area may contain precious metal deposits.
MRZ-3b (h-12) (Plate 2b)	Marble Canyon area	Speculative Resources	Remote sensing, geochemical sampling, and geologic mapping defines area of northerly trending fault zones that contain anomalous amounts of arsenic, antimony, mercury, and zinc and is suggestive of epithermal gold mineralization.

TABLE 2. SUMMARY LISTING OF AREAS CLASSIFIED MRZ-2 AND MRZ-3 FOR DEPOSITS FORMED BY CONTACT METASOMATISM (SKAMS). (See Plates 2a and 2b)

RESOURCE ZONE	NAME/VICINITY	RESERVES/RESOURCES	SUPPORTING EVIDENCE FOR MRZ ASSIGNMENT**
MRZ-3a (s-1) (Plate 2a)	Copper Queen Mine area	Moderate to low potential for presence of undiscovered base and precious metal resources	Limited base and precious metal production from historic mining activity in a garnet-epidote skarn zone. Last recorded production was in 1915.
MRZ-3a (s-2) (Plate 2a)	Sylvania Canyon area	Moderate to low potential for presence of undiscovered base and precious metal resources	Some historic production of scheelite and copper along a northwest trending zone of metamorphic roof pendants within the Sylvania Mountain pluton.
MRZ-3a (s-3) (Plate 2a)	Victor Consolidated Scheelite Prospect area	Moderate to low potential for presence of undiscovered base and precious metal resources	Historic production of scheelite, copper, gold, and some talc along an arcuate shaped septum of metamorphic carbonate 8 miles in length. Recorded production was in 1907 and 1912.
MRZ-3a (s-4) (Plate 2a)	Big Dodd-Little Dodd Spring area	Moderate potential for presence of undiscovered base and precious metal resources	Production of copper, lead, tungsten, silver, and molybdenum from historic mines scattered along faulted septum of metamorphic rocks which extend for over 8 miles between Grapevine Canyon and the Lippincott mines.
MRZ-3a (s-5) (Plate 2a)	Coyote-Black Rock Prospect area	Low potential for presence of undiscovered base and precious metal resources	Limited base and precious metal production from historic mining activity in several small isolated metamorphic roof pendants.
MRZ-3a (s-6) (Plate 2b)	Anton and Pobst Mine area	Low potential for presence of undiscovered base and precious metal resources	Limited base and precious metal occurrence with some production of garnet from historic mines along pods of calcsilicate rocks.
MRZ-2b (s-7) (Plate 2b)	Waucoba Tungsten Mine area	Low to moderate potential for presence of undiscovered base and precious metal resources	Historic production of tungsten from small, irregular, garnetiferous lenses. Last recorded production was 1939 to 1942.
MRZ-2b (s-8) (Plate 2b)	Mary V-Indian Prospect area	Low potential for presence of undiscovered base and precious metal resources	Limited base and precious metal occurrence (copper, silver, tungsten and molybdenum) from prospects along a discontinuous skarn zone between Paleozoic carbonate rocks and Hunter Mountain quartz monzonite.
MRZ-2b (s-1) (Plate 2b)	Dry Mountain area	Speculative Resources	Geologic mapping, geochemical sampling, and abundance of roof pendant rock in the Hunter Mountain pluton indicate that this area could contain a molybdenum porphyry system or skarn deposits in carbonate rocks adjacent to plutonic contacts.

TABLE 3. SUMMARY LISTING OF AREAS CLASSIFIED MRZ-2 AND MRZ-3 FOR PLACER GOLD DEPOSITS. (See Plates 2a and 2b)

RESOURCE ZONE	NAME/VICINITY	RESERVES/RESOURCES	SUPPORTING EVIDENCE FOR MRZ ASSIGNMENT**
MRZ-3a (p-1) (Plate 2a)	Marble Canyon Gold Placers	Moderate potential for economic resources of placer gold deposits	Historic gold production from numerous drift mine operations since the early 1930's. The gold occurs in older gravels in the canyon bottom and walls.
MRZ-3a (p-2) (Plate 2a)	Beveridge Canyon Gold Placers	Low potential for economic resources of placer gold deposits	Historic placer claims on small alluvium deposits along the eastern escarpment of the Inyo's. No production; USBM samples indicate gold values in the alluvium.
MRZ-3a (p-3) (Plate 2a)	Oriental Wash-Tule Canyon Placer Deposits	Low potential for economic resources of placer gold deposits	USBM sampling of Quaternary alluvial gravels in this area contain low concentration of gold derived from lode gold occurrences in Nevada.
MRZ-3b (p-1) (Plate 2a)	Northern Eureka Valley Placers	Speculative Resources	Several exposures of Tertiary conglomerate units which may be equivalent to Tertiary auriferous gravels elsewhere in the White and Inyo Mountains.

TABLE 4. SUMMARY LISTING OF AREAS CLASSIFIED MRZ-2 AND MRZ-3 FOR INDUSTRIAL MINERALS. (See Plates 3a and 3b)

RESOURCE ZONE	NAME/VICINITY	RESERVES/RESOURCES	SUPPORTING EVIDENCE FOR MRZ ASSIGNMENT**
MRZ-2a (Sulfur-1) (Plate 3a)	Crater Sulfur mine area	Measured reserves of sulfur	Two principal areas of sulfur mineralization occur as north-south trending zones 2,500 ft. in length with irregular widths. Reserves are estimated to be 3 million tons of 40% sulfur.
MRZ-2a (Talc-2) (Plate 3b)	White Eagle Talc mine	Indicated reserves of talc	Active mine producing high quality tremolite-free talc for use in ceramic tile and cosmetic manufacture. Current production of between 2,000 and 4,000 tons per year with a total production of 50,000 tons between 1941 and 1979.
MRZ-2a (Wollastonite-3) (Plate 3b)	J.O. Mine area	Indicated and inferred reserves estimated to be 18,000,000 (or more) tons containing an average of 60% wollastonite	Lenticular body of wollastonite crops out over an area measuring 5 miles long by 300-1,000 ft. wide. Based on limited exploratory drilling estimates of resources range up to 200 million tons of wollastonite.
MRZ-2b (Na, Bo-1) (Plate 3b)	Saline Valley Playa Deposits	Inferred resources of sodium and borate	Historic salt production from the 12-square mile salt lake along the southwestern side of the valley. Salt was produced from 1913 to 1930 and transported 13.5 miles over the Inyo Mountains by aerial tramway.
MRZ-2b (Na, K-2) (Plate 3a)	Deep Springs Valley Playa Deposits	Inferred resources of sodium and potassium	Some historic production of sodium and potassium from a 1-square mile lake which contains concentrated brine.
MRZ-2b (Talc-3) (Plate 3b)	Bonham-Florence-Holiday Talc mine area	Inferred talc resources of 500,000 tons	Lenticular bodies of talc in a flinty, dolomitic limestone crop out at all 3 mines over a 3 mile long zone. The talc has been historically mined since 1930 for both steatite- and non-steatite-grade talc.
MRZ-2b (Talc-4) (Plate 3b)	Grey Eagle-Dorris Dee-Snowflake Talc mines	Inferred talc resources of 400,000 tons	This zone includes 3 mines which contain irregular, lenticular bodies of non-tremolitic, steatite-grade talc along the eastern escarpment of the Inyo Mountains. These mines have had intermittent production since the 1940's.
MRZ-3a (Talc-1) (Plate 3b)	Eastern Inyo Mountain Talc area	Moderate to high potential for economic resources of talc	Area encompasses the Willow Creek, Grey Eagle, White Eagle, Dorris Dee, and Snowflake talc mines that lie along the eastern escarpment of the Inyo Mountains. Contained within the area are roughly parallel bands of quartzite, marble, dolomite, and granitic material, which locally have been altered to talc.
MRZ-3a (Talc-2) (Plate 3b)	Nicolaus-Eureka Talc Mine area	Moderate to high potential for economic resources of talc	Historic production of talc from an arcuate-shaped septa of Paleozoic carbonate rock in contact with quartz monzonite. The area contains 4 mines which have produced in excess of 75,000 tons of steatite-grade talc since 1940.
MRZ-3a (Li, U-3) (Plate 3a)	Eureka Valley Playa area	Moderate to low potential for economic resources of lithium and uranium	Anomalous concentrations of lithium were detected in a U.S.G.S. well drilled 1978, along with anomalous concentrations of uranium in the water below 200 feet.

TABLE 4. cont.

RESOURCE ZONE	NAME/VICINITY	RESERVES/RESOURCES	SUPPORTING EVIDENCE FOR MRZ ASSIGNMENT**
MRZ-3a (Silica-4) (Plate 3a)	Eureka Valley Sand Dunes	Moderate to low potential for economic resources of silica	This area contains 300 million tons of eolian sand in dunes 4,000 feet by 3 miles and 700 feet high. The sand consists of approximately equal amounts of quartz and feldspar.
MRZ-3a (Silica-5) (Plate 3b)	Saline Valley Sand Dunes	Moderate to low potential for economic resources of silica	Several square miles of eolian sand consisting of approximately equal amounts of quartz and feldspar along with several percent of dark minerals.
MRZ-3a (Wollastonite-6) (Plate 3b)	San Lucas Canyon-Nelson Range area	Low to moderate potential for economic resources of wollastonite	Nearly white wollastonite occurs in calc-silicate rock and marble at the contact with quartz monzonite.
MRZ-3a (pz-7) (Plate 3b)	Saline Valley Pozzolan area	Low to moderate potential for economic resources of pozzolan	The area consists of Tertiary rhyolitic tuffs that contain zeolites and trace amounts of mercury. Several prospects investigate zeolitic tuffs which may be suitable for use in the manufacture of pozzolanic cement, concrete, and zeolites.
MRZ-3a (Si-8) (Plate 3b)	Northern Saline Valley Quartz area	Low to moderate potential for economic resources of euhedral quartz crystals	This small area consists of numerous shallow prospect pits which expose right and left-handed euhedral quartz crystals that contain fluid, pyrite, and stibnite. Quartz crystals have been produced from this site since 1973.
MRZ-3a (Talc-9) (Plate 3b)	Walker Prospect	Low potential for economic resources of talc	This area contains small discontinuous pods and lenses of contaminated talc occurring along or in close proximity to an igneous-metasedimentary contact.
MRZ-3a (Pumice-10) (Plate 3a)	Oasis Pumice area	Low to moderate potential for economic resources of pumice	This area consists of several open pits that have developed white, angular, water-lain pumice and tuff. These deposits were worked in the late 1940's and early 1950's.
MRZ-3a (Gypsum-11) (Plate 3a)	El Capitan-Crater mine area	Inferred resources of gypsum	Nearly pure masses and pods of gypsum occur at the El Capitan Mercury mine and disseminated gypsum occurs with the sulfur at the Crater mine.
MRZ-3A (ls, sl, 1,2,12)	Eureka-Saline carbonate and siliceous rocks	High to moderate potential for economic resources of limestone and silica	Large areas of the Study Area are underlain by carbonate and siliceous rocks that elsewhere have comprised economic resources of limestone and silica.
MRZ-3A (Bo-13)	North Death Valley area	Moderate potential for economic resources of borates	Area drilled by U.S. Borax in 1987-88 with anomalous amounts of boron detected.
MRZ-3b (Na, K-1) (Plate 3a)	Deep Springs Valley Playa	Speculative Resources	Geologic mapping defines an area within the valley that is underlain by Quaternary lake sediments and which may possibly contain concentrated sodium and potassium compounds.
MRZ-3b (Na, Li-2) (Plate 3a)	Eureka Valley Playa Deposits	Speculative Resources	Geologic mapping defines an area within the valley that is underlain by Quaternary lake sediments which may contain concentrations of sodium and lithium.

PART II - GEOLOGY AND MINERAL RESOURCES

GEOGRAPHIC SETTING

The Blanco Mountain, Dry Mountain, Last Chance Range, Magruder Mountain, Marble Canyon, Mt. Barcroft, New York Butte, Piper Peak, Soldier Pass, Ubehebe Crater, Ubehebe Peak, Waucoba Mountain, Waucoba Spring and Waucoba Wash 15-minute quadrangles (Figure 2) comprise the rectangular-shaped area bounded by the White-Inyo Mountains on the west, Fish Lake Valley on the north, the California-Nevada stateline and the western boundary of the Death Valley National Monument on the east, and Highway 190 on the south. Parts of the Last Chance Range, Magruder Mountain, Mt. Barcroft, Piper Peak, Soldier Pass and Ubehebe Crater quadrangles lie within the state of Nevada; however, only those portions of these quadrangles occurring in California are included in this study.

The study area lies within the Basin and Range geomorphic province and encompasses seven discrete mountain ranges separated by alluvial valleys and playas. The northernmost part of the area includes the southernmost foothills of the White Mountains which merge into the Inyo Mountains north of Deep Springs Valley. The two ranges, composed principally of Late Mesozoic granitics with septa and pendants of Paleozoic sedimentary rocks, are separated by alluvial deposits of Deep Springs Valley. In turn, the eastern side of the Inyo Mountains slope into the Eureka and Saline Valleys which are bordered by the Saline and Last Chance Ranges. Tertiary trachyandesite and basalt in volcanic flows, plugs, and tuffaceous sediments cover most of the Saline Range and parts of the Last Chance Range. The Last Chance Range, underlain by Precambrian and Paleozoic marine sedimentary rocks and Mesozoic granitic intrusions, comprises a large north-to-northwest-trending escarpment that to the north merges into the Sylvania Mountains; to the south, merges into the Panamint Range; and to the east, into the broad, eastward-sloping alluvial and pediment surfaces that comprise Death Valley.

The extreme southern part of the study area, marked by the junction of the Panamint and Nelson Ranges, is principally underlain by Mesozoic granitic intrusions, with minor Tertiary age basalts and Paleozoic marine sedimentary rocks. Elevations in the study area range from 11,101 feet at Keynot Peak in the Inyo Range to less than 1,059 feet near the salt lake along the western side of Saline Valley.

Primary access into the area is provided by California State Highways 168 and 190, by the partly-paved Big Pine-Death Valley Road, and by the secondary gravel roads of North Eureka Valley-Fish Lake Valley, Saline Valley, Oriental Wash, Lippincott Mine, Hunter Mountain and Lee Flat roads as shown on Figure 4. Additional access is provided by several mine roads and jeep trails, but, overall, ground access is difficult due to the rugged terrain and scarcity of roads. The area is uninhabited with the exception of a small settlement at Deep Springs Junior College, several ranches in Fish Lake Valley, and inhabited mine properties in Saline Valley.

The sparse vegetation in the study area consists mostly of sagebrush, creosote brush, cacti, grasses and with pinon pine and juniper trees growing in the higher elevations at Hunter Mountain, Last Chance Range, and along Whippoorwill Flat. Summer temperatures easily exceed 100°F; spring and fall are windy but mild; winter temperatures are below freezing. Annual precipitation is minimal for the region as indicated by the vegetation.

GEOLOGIC FRAMEWORK

Previous Geologic Work

The general geology of the study area has been well described and mapped by several investigators: McAllister (1955,1956) Ubehebe Peak quadrangle; Hall and Stevens (1963) and Hall (1971) Panamint Butte quadrangle; Hall and Mackevett (1959,1962) Darwin quadrangle; Nelson (1966, 1971) Blanco Mountain, Waucoba Mountain and Waucoba Spring quadrangles; McKee and Nelson (1967) Soldier Pass quadrangle; Ross (1967,1970) Waucoba Wash quadrangle; Burchfiel (1969) Dry Mountain quadrangle; Wrucke (1985) Last Chance Range quadrangle and McKee (1985) Magruder Mountain quadrangle. The geologic map (Plate 1), which accompanies this report, has been compiled from these maps.

Numerous reports have been published concerning mineral deposits in the study area. Buchard (1881,1882,1884,1885) and Leech (1890) reported on the status of numerous gold and silver mines active during that period of time. Goodyear (1888) chronicled metallic mines in and adjacent to Deep Springs Valley. Knopf (1914) reported on the mineral resources of the Inyo and White Mountains. Several authors for the California Division of Mines and Geology, including Waring and Huguenin (1917), Tucker and Sampson (1938), and Norman and Stewart (1951), have described mines and mineral deposits within the area. Page (1951) detailed the nature of talc deposits within the Inyo Mountains. Lynton (1938) discussed the sulphur deposits of Inyo County. Hanks (1882), Bailey (1902), Gale (1914), and Ver Planck (1958) reported on the salt, borax, and potash deposits of Saline Valley.

The Bureau of Land Management compiled information on mines and prospects in the study area during the 1970's as part of its unpublished Geology-Energy-Minerals (GEM) inventory.

Detailed mineral resource reports have been prepared by the U.S. Bureau of Mines for Saline Valley WSA (BLM No. CDCA-117) (McHugh and others, 1984), Lower Saline Valley WSA (BLM No. CDCA-117A) (Rumsey, 1983), Hunter Mountain WSA (BLM No. CDCA-123) (Causey and others, 1983), Panamint Dunes WSA (BLM No. CDCA-127) (Leszcykowski, 1985), and Little Sand Springs WSA (BLM No. CDCA-119) (Miller, 1983). Theses by Robison (1964), McCoard (1970), Hill (1972), Herron (1980) and Zellmer (1980) discuss details of geology and mineral occurrences in parts of the study area.

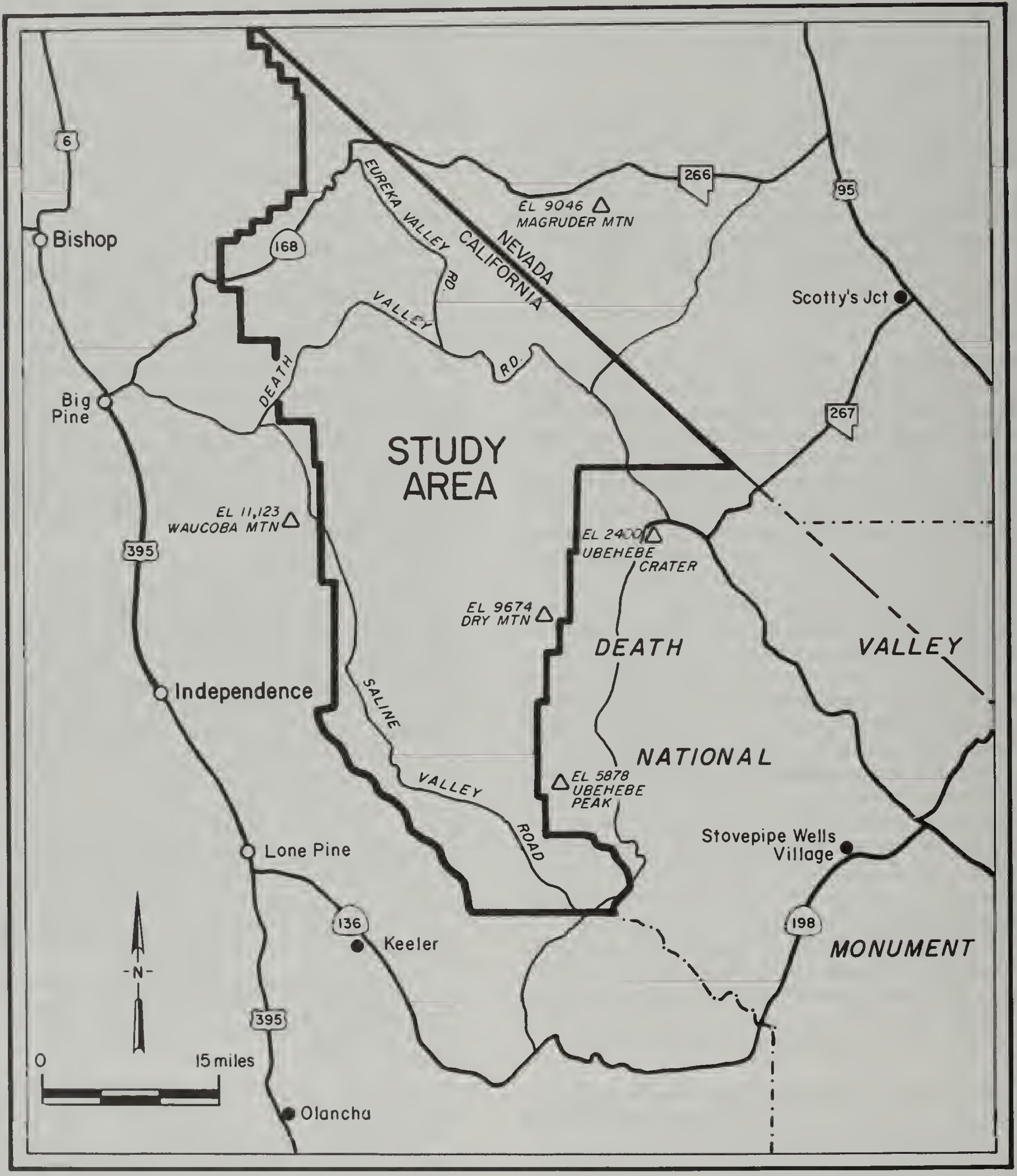

Figure 4. Map of Eureka-Saline Valley area showing roads and towns.

A summary of the geology of the study area, excerpted from published material, is presented below. For more detailed discussions, the reader is referred to the bibliography at the end of this report.

Regional Geology - Eureka-Saline Valley Area

Precambrian and Paleozoic Age Rocks

Strata of Precambrian to Paleozoic age have been recognized in the Eureka-Saline Valley SMARA study area. The total stratigraphic section formed by these rocks is on the order of 35,000 feet in the western part of the area and 16,000 feet in the eastern part of the area (Stewart and others, 1966). Rock types in the Precambrian-Paleozoic section consist of quartzite, siltstone, shaly siltstone, limestone, and dolomite.

The Precambrian-Cambrian units in the study area show a thick section of shelf-miogeoclinal strata that changes lithologic character between the western and eastern part. This change takes place across a narrow north-northeast-trending zone that extends through the central part of the Saline Range, along Eureka Valley, and across the northern part of the Last Chance Range. The Precambrian and Cambrian strata east of the zone consist of the Death Valley series (Wood Canyon Formation, Zabriskie Quartzite, and Carrara Formation), which is essentially a terrigenous, poorly fossiliferous sequence that contains more quartzite and less siltstone and limestone than the equivalent strata in the White-Inyo Range. The strata in the White-Inyo Range are more fossiliferous and represent a mixed terrigenous and carbonate sequence containing more siltstone and limestone (Nelson, 1976). These differences were first recognized by Stewart (1965) in equivalent-age rocks in the northern and southern parts of the Last Chance Range.

The facies changes in the Precambrian and Cambrian rocks are indicated by the stratigraphic nomenclature, which is different for the formations of the Precambrian, Lower Cambrian, and lower part of the Middle Cambrian on opposite sides of the zone (see Figure 5; Stewart, 1965,1970; Nelson, 1976; and Wrucke, 1984). The stratigraphic differences between the western and eastern parts of the area are less in the Middle Cambrian, and in the Upper Cambrian, the same units are found throughout the area.

The Precambrian rocks in the western part of the area have been divided into three formations and part of a fourth. The oldest belong to the Wyman Formation, which consists of argillite, quartzitic sandstone, and siltstone, and subordinate dolomite (Nelson, 1971). The upper 9,000 feet of the Wyman Formation is exposed in the western part of the study area (Nelson, 1962). Overlying the Wyman Formation is about 2,000 feet of dolomite and calcareous rocks of the Reed Dolomite (Nelson, 1962, 1971). Limestone, quartzite, sandstone, dolomite and shale of the Deep Spring Formation, about 1,500 feet thick, rest on the Reed Dolomite (Wrucke, 1984). The youngest Precambrian rocks are in the lower half of the Campito Formation, which overlies the Deep Spring Formation. The Campito Formation is about 3,500 feet thick and is composed of sandstone, siltstone, and shale.

The Ordovician to Mississippian age formations in the study area consist principally of carbonate rocks except for the widespread mid-Ordovician Eureka Quartzite, minor sandstones within the Devonian carbonates and Upper Mississippian siltstones and shales. They have an aggregate thickness of about 7,000 feet. The Ordovician formations consist of the Pogonip Group, which is equivalent to the Barrel Spring and Johnson Spring Formations in the western portion, and the Ely Springs Dolomite (Figure 6).

The Devonian and Mississippian stratigraphic units consist of the Silurian-Devonian Hidden Valley Dolomite and the Lost Burro Formation and the Mississippian Tin Mountain Limestone, the Perdido Formation (siltstone and limestone), and the Resting Spring Shale.

The Precambrian-Cambrian boundary, based on *Trilobita olenellus*, is placed near the top of the Reed Dolomite (Nelson, 1981). The Cambrian rocks in the Eureka-Saline Valley study area are about 11,000 feet thick based on work by Nelson (1971,1972,1981), Ross (1967), and Stewart (1970). The Lower Cambrian strata in the western part of the area are about 11,000 feet thick and consist of sandstone, siltstone, and quartzite, with small amounts of limestone. The Lower Cambrian units are the upper part of the Campito Formation, the Poleta, Harkless, and Saline Valley Formations and the Mule Spring Limestone with the Mule Spring Limestone being the only unit that is predominantly calcareous. The Middle and Upper Cambrian rocks have a total thickness of about 5,000 feet and are composed of mostly carbonate rocks. Formations in this part of the stratigraphic section are the Monola Formation of Middle Cambrian age, the Bonanza King Dolomite of Middle and Late Cambrian age, the Lead Gulch Formation, and the Tamarack Dolomite of Late Cambrian age (Nelson, 1971,1981; Ross 1967). The Lead Gulch Formation is composed of hornfels (Nelson, 1971).

Cambrian strata in the eastern part of the area are about 9,200 feet thick and have been divided into five formations. The oldest is the Wood Canyon Formation, which elsewhere in the Death Valley region contains upper Precambrian rocks. Within the study area, the Wood Canyon Formation is reported to contain only the Cambrian portion of the formation (Wrucke, 1984). The Wood Canyon Formation in the Last Chance Range consists of quartzite, siltstone, and limestone and has been correlated with the upper part of the Campito Formation, the Poleta, and the Harkless Formations, which crop out in the western part of the study area. Overlying the Wood Canyon Formation is the Zabriskie Quartzite and the Carrara Formation of Lower to Middle Cambrian age, which have been correlated with the Saline Valley Formation, the Mule Spring Limestone, and the Monola Formation in the western part of the study area (see Figure 5). The Carrara Formation, composed of limestone and siltstone, is overlain by the Bonanza King Dolomite of Middle and Late Cambrian age and the Nopah Formation of Late Cambrian age. Both the Bonanza King Dolomite and the Nopah Formation are dominantly dolomite with some shale beds.

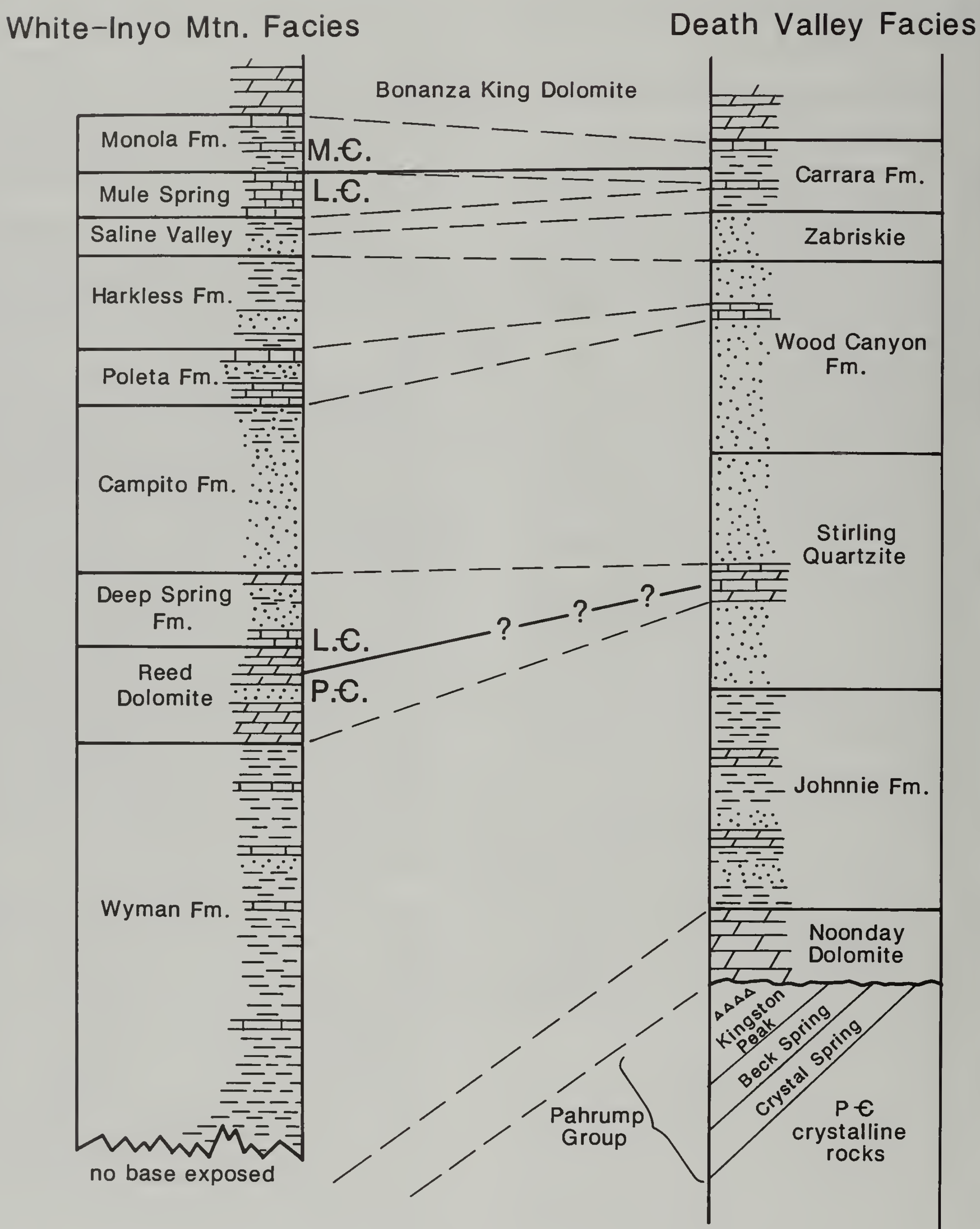

Figure 5. Lake Precambrian, Early Cambrian, and Middle Cambrian sedimentary rocks in the Eureka-Saline Vallley study area.

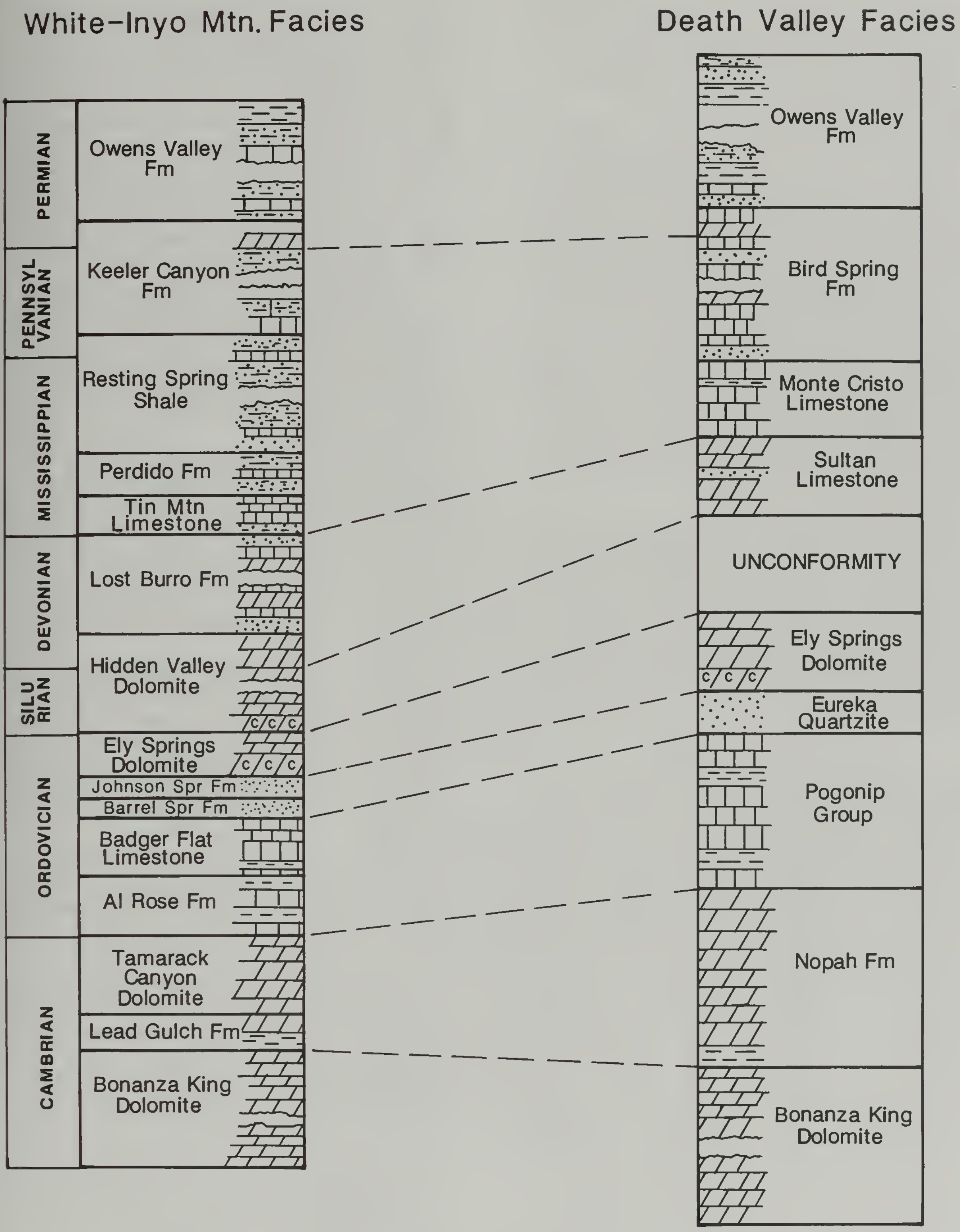

Figure 6. Cambrian to Permian sedimentary rocks in the Eureka-Saline Valley SMARA study area.

The Pennsylvanian and Permian rocks are found in two formations exposed in the southern part of the area (Burchfiel, 1969; McAllister, 1956). These units total about 4,500 feet and consist of the Pennsylvanian-Permian Keeler Canyon Formation (limestone) and its equivalent in the eastern part, the Bird Spring Formation and the Permian age Owens Valley Formation (shale, siltstone, and limestone) (Figure 6).

The Precambrian to Devonian units throughout the area are typical of a shelf-miogeoclinal succession where each of the sandstone and quartzite units pinch out westward or northwestward as the carbonate and shales thicken (Figure 7). Sedimentary structures, such as ripple marks and cross stratification, together with the general geographic distribution of carbonate-dominated sections and reefal structures also indicate sediment derivation from the craton to the east (Nelson, 1981). The late Paleozoic (Mississippian) detrital rocks of the Perdido Formation and the Resting Spring Shale represent clastic wedge deposits formed in response to the Antler orogeny during late Devonian to early Mississippian time. The latest Paleozoic Keeler Canyon Formation and Bird Spring Limestone represent a return to carbonate sedimentation in the time between the Antler and Sonoman orogenies.

Rocks ranging in age from Precambrian to Cenozoic are widely exposed in the Eureka-Saline Valley study area (Plate 1). These rocks record a history of Precambrian and Paleozoic marine sedimentation, Mesozoic plutonism, and Cenozoic volcanic and sedimentary deposition. The study area consists of typical basin and range topography where tilted fault blocks and Mesozoic granitic plutons are separated by valleys covered with alluvial sediments.

Mesozoic Granitic Rocks

Mesozoic plutonic rocks, considered to be an eastern extension of the Sierra Nevada batholith (Bateman and others, 1963; Ross, 1969) make up about one third of the pre-Cenozoic exposures in the Eureka-Saline Valley study area. These plutons, of which 12 have been differentiated on Plate 1, intrude and metamorphose the upper Precambrian and Paleozoic sedimentary rocks of the region. Generally, the plutons have sharp and steep contacts with the surrounding country rock and their metamorphic effects extend as far as two miles from the granitic contacts. Regionally, within the Inyo Mountain batholith, the majority of the plutonic rock is granodiorite; but within the boundaries of the study area, quartz monzonite predominates. Intrusive relation and radiometric ages indicate the following sequence, from oldest to youngest: (1) the diorite of Marble Canyon, (2) the monzonite of Joshua Flat, Hunter Mountain quartz monzonite, and quartz monzonite of Beer Creek (relative ages of these three plutons are unknown), (3) monzonite of Eureka Valley and the Paiute Monument quartz monzonite, (4) granodiorite of Mt. Barcroft, (5) quartz monzonite of Indian Garden Creek, (6) quartz monzonite of McAfee Creek, (7) the quartz monzonite of Papoose Flat, (8) quartz monzonite of Marble Creek, and (9) diorite and quartz monzonite of Last Chance Range.

The diorite of Marble Canyon, exposed as irregular but generally elongate bodies within the quartz monzonite of Joshua Flat, outcrops in a small area along the western border of the study area. It is a medium-gray, medium-grained diorite body with small amounts of monzonite and granodiorite. It is considered to be Jurassic in age (Nelson, 1971) and is intruded by the monzonite of Joshua Flat, which is exposed northward from Marble Canyon to the southern end of Deep Springs Valley. This pluton consists of medium-grained hornblende, biotite, and occasionally augite-bearing monzonite to quartz monzonite. K-Ar age determinations ranging from 170 to 185 million years (m.y.) suggest that this rock is Middle Jurassic in age (McKee and Nash, 1967; McKee and Nelson, 1967).

The northern part of the study area, comprising th western and eastern boundaries of Deep Springs Valle and continuing eastward into the Sylvania Mountain, exposes the quartz monzonite of Beer Creek, a medium to coarse-grained porphyritic quartz monzonite that gives K-Ar dates ranging from 151 to 163 m.y. (McKee and Nelson, 1967).

Within the southern part of the study area, the Hunter Mountain quartz monzonite is exposed over a large area. This pluton is mostly quartz monzonite in composition, but along border zones it may be compose of monzonite, syenodiorite, diorite, and hornblende gab bro caused by reaction with the country rock (McAllister, 1955; Hall, 1971). K-Ar dates range from 160 to 180 m.y., which suggests that the pluton is Jurassic (Ross, 1969).

The Hunter Mountain quartz monzonite is intrude by the Paiute Monument quartz monzonite which is exposed along the crest of the Inyo Mountains. It is typically light-gray, coarse-grained quartz monzonite characterized by very large phenocrysts of pink to red orthoclase and anhedral masses of quartz. K-Ar dates 155 to 165 m.y. (Ross, 1969) indicates that this pluton is Jurassic.

Within the upper part of Eureka Valley, dark-weathering, medium-grained augite and olivine-bearin monzonite crops out along the western side of the valley. K-Ar dates of 163 to 171 m.y. (McKee and Nelson, 1967) indicate that this pluton is Jurassic.

Northward from Cottonwood Creek, along the easter slope of the White Mountains, a series of four plutons are exposed. In contact with the quartz monzonite of Beer Creek is the granodiorite of Mt. Barcroft, a dark-gray, medium-grained, quartz-poor, mafic biotite-hornblende granodiorite that has been age dated at 132.5 m.y. based on K-Ar dating (McKee, 1970). The quartz monzonite of Indian Garden Creek, a fine-to-medium grained, felsic, biotite quartz monzonite, intrudes the granodiorite of Mt Barcroft and has been dated at 92.7 ± 3 m.y. based on K-Ar dating (McKee, 1970). The quartz monzonite of McAfe Creek, a coarse-grained, felsic, quartz-rich biotite quartz monzonite, has been dated at 83.3 m.y. on K-Ar basis.

The quartz monzonite of Papoose Flat crops out in th central part of the Inyo Mountains along the western sid of the study area. The rock is a light-gray, coarse-

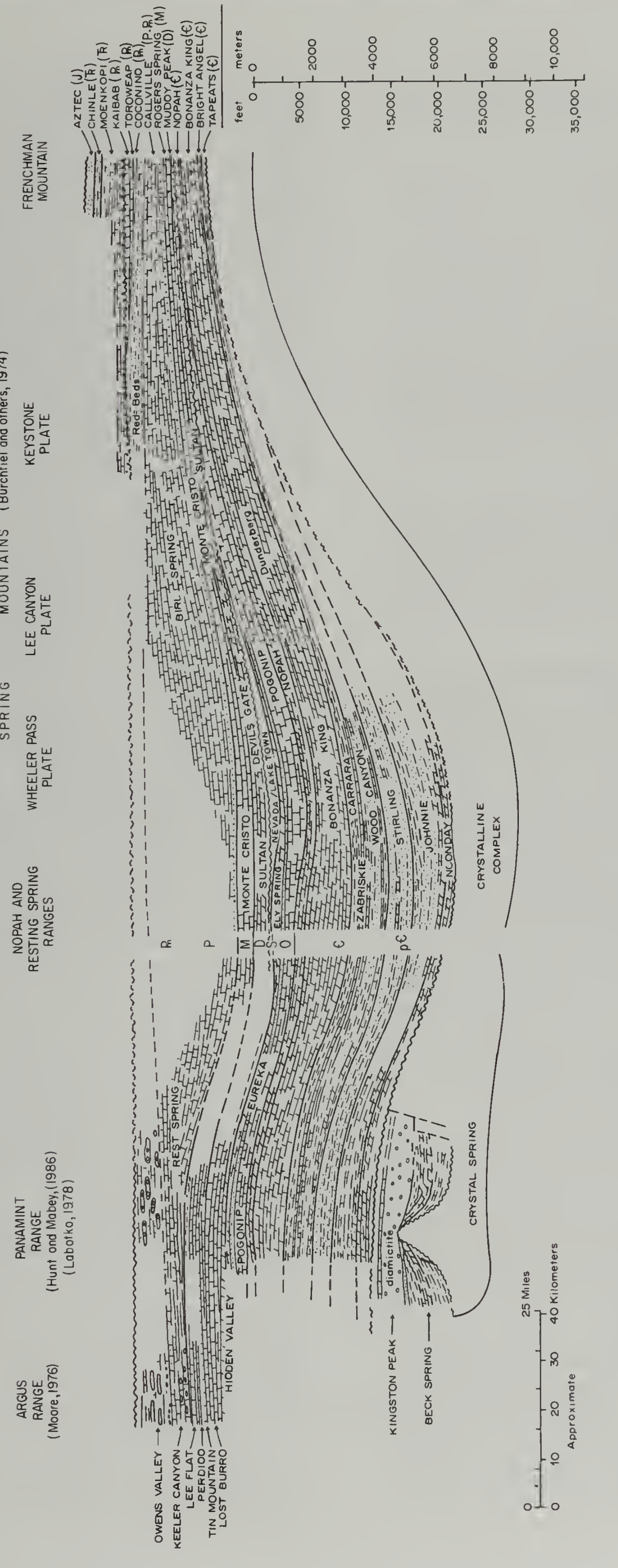

Figure 7. Generalized stratigraphic framework of the Precambrian and Paleozoic rocks from the Inyo-White Mountains to Frenchman, near Las Vegas (Burchfiel and Davis, 1981)

grained, porphyritic, biotite quartz monzonite which has been K-Ar dated at about 80 m.y., which indicates that the pluton is Cretaceous in age (Kistler and others, 1965).

The quartz monzonite of Marble Creek crops out along the northernmost region of the study area in Fish Lake Valley. The pluton is a porphyritic, medium-grained, biotite-hornblende quartz monzonite, highly variable in texture and composition, and age dated at 70.7 - 74.5 m.y. based on K-Ar dating (McKee, 1970).

Several small plutons, varying in composition from dark-gray, coarse-to medium-grained, biotite-pyroxene diorite, to light-colored, biotite aplite, to coarse-grained quartz monzonite occur within the Last Chance Range. These plutons have given K-Ar age dates of 6.3 to 7.5 m.y. and 7.3 to 7.9 m.y., respectively (Elliot and others, 1984).

In addition to the above delineated plutons, numerous light- and dark-colored dikes and small intrusive bodies of diabasic to alaskitic composition occur at scattered localities throughout the study area. The dikes generally have a northerly to northeasterly trend, exhibit vertical contacts, and show development of chilled margins.

Cenozoic Volcanic and Sedimentary Rocks

Tertiary rocks of the study area crop out extensively in the Saline Range, at scattered localities in the Last Chance Range northward to the Sylvania Mountains, in the mountains north and south of Dry Mountain, along the northeastern side of Eureka Valley, the western side of Deep Springs Valley, and along the northeastern end of Death Valley. These Tertiary deposits, consisting of a variety of sedimentary and volcanic rocks (Figure 8), rest uncomformably on Paleozoic metasedimentary works or Mesozoic granitic rock.

The oldest Tertiary deposits belong to the late Miocene Ammonia Tanks member of the Timber Mountain Tuff K-Ar dated at 10.5 to 11.5 m.y. (Byers and others, 1976), which in the Little Sand Spring area of northern Death Valley consists of welded and unwelded rhyolite ash flows that have an aggregate thickness of at least 1,000 feet. The Timber Mountain Tuff is grouped on the map with other Tertiary deposits in a unit of undifferentiated sedimentary and volcanic rocks. Included are overlying latite flows and poorly consolidated sandstone and conglomerate interlayered toward the top with rhyolite flows and tuffs. At the top of this undifferentiated unit are olivine basalt flows about 7.5 m.y. old (Elliott and others, 1984, Wrucke and others, 1984) that are interbedded with volcaniclastic sedimentary rocks. The Tertiary deposits vary in thickness from a few hundred feet to possibly as much as 3,000 feet.

The oldest sedimentary rocks of Tertiary age are siltstone, sandstone, and limestone pebble and cobble conglomerate exposed in the central part of the Last Chance Range and low on the eastern slopes of the mountains north of Dry Mountain. No datable materials have been found in these rocks. They are assumed to be Miocene or early Pliocene because they underlie a basalt that has been K-Ar dated at about 4.0 m.y. (Wrucke and others, 1984). This basalt is a remnant of a volcanic field that extended from the eastern side of the Inyo Mountains easterly across the Saline Range to the Last Chance Range and the mountains around Dry Mountain. Basalt at the base of the volcanic section in the Saline Range, the Last Chance Range, and the mountains north of Dry Mountain has been dated by K-Ar methods at 3.7±0.2 to 4.2±0.3 m.y. (Elliott and others, 1984). Overlying this basalt in the Saline Range are air-fall and water-reworked tuffs, locally interlayered with basalt, which in turn are overlain by a thick latite flow K-Ar dated at 3.4±0.2 m.y. (Elliott and others, 1984). The latite flowed from a plug dome near the east edge of the range. A small latite plug and latite flows interlayered with basalt in the northeastern part of the Last Chance Range are petrographically almost identical to the latite in the Saline Range and, therefore, may be of about the same age. Most of the extensive basaltic rock in the Saline Range is younger than the latite and is about 2.5 m.y. old (Ross, 1970; Elliott and others, 1984). On the basis of chemical analyses, Ross (1970) concluded that many of the flows that resemble basalt in the Saline Range are trachyandesites. Rhyolite tuff, mapped by Nelson (1971), beneath basalt and trachyandesite in the Saline Range and intrusive rhyolite found in Paleozoic strata on the west side of the Last Chance Range have not been dated. Also undated is a diatreme near the Crater mine area. Abundant quartz crystals in the diatreme are suggestive of rhyolitic affinities. The poorly-consolidated gravels in uplifted, fault-bounded masses along the Death Valley-Furnace Creek fault zone east of the Last Chance Range may be the youngest Tertiary deposits in the area studied, or they may be of Quaternary age (Wrucke and others, 1984).

Tuffaceous sediments of the Miocene Esmeralda Formation, which includes sandstone, siltstone, pumiceous air-fall tuffs and minor basalt flows, crop out across the southern end of Fish Lake Valley region. Later flows of locally scoriaceous olivine basalt, Pliocene in age, cap parts of the Esmeralda Formation along the northwest side of Piper Mountain and scattered occurrences of upper Pliocene to Quaternary basalts occur along the northern terminus of Eureka Valley. Small, scattered remnants of late Cenozoic basalt, mainly lava flows and agglomerate, occur along the southern margin of Hunter Mountain-Lee Flat area which become more widespread and voluminous to the south and east. The lavas are remnants of late Miocene to Pliocene age flows that have been offset by basin and range faulting and subsequently isolated by erosion (Elliott and others, 1984).

A large percentage of the study area is underlain by unconsolidated or, at most, weakly indurated rocks of Quaternary age, principally alluvial-fan and playa deposits that accumulated as sediments under present stream channels and on pediments that were left as alluvium-covered terraces by faults along basin margins and by entrenchment. Quaternary deposits are divided into two groups, older and younger. The older deposits are discontinuously exposed in many canyons, as erosional remnants on higher alluviated areas and as Pleistocene and Holocene fanglomerates that blanket the lower flanks of the mountains and slop to the valley bottoms. Active sand dunes and blankets of sands cover some of the

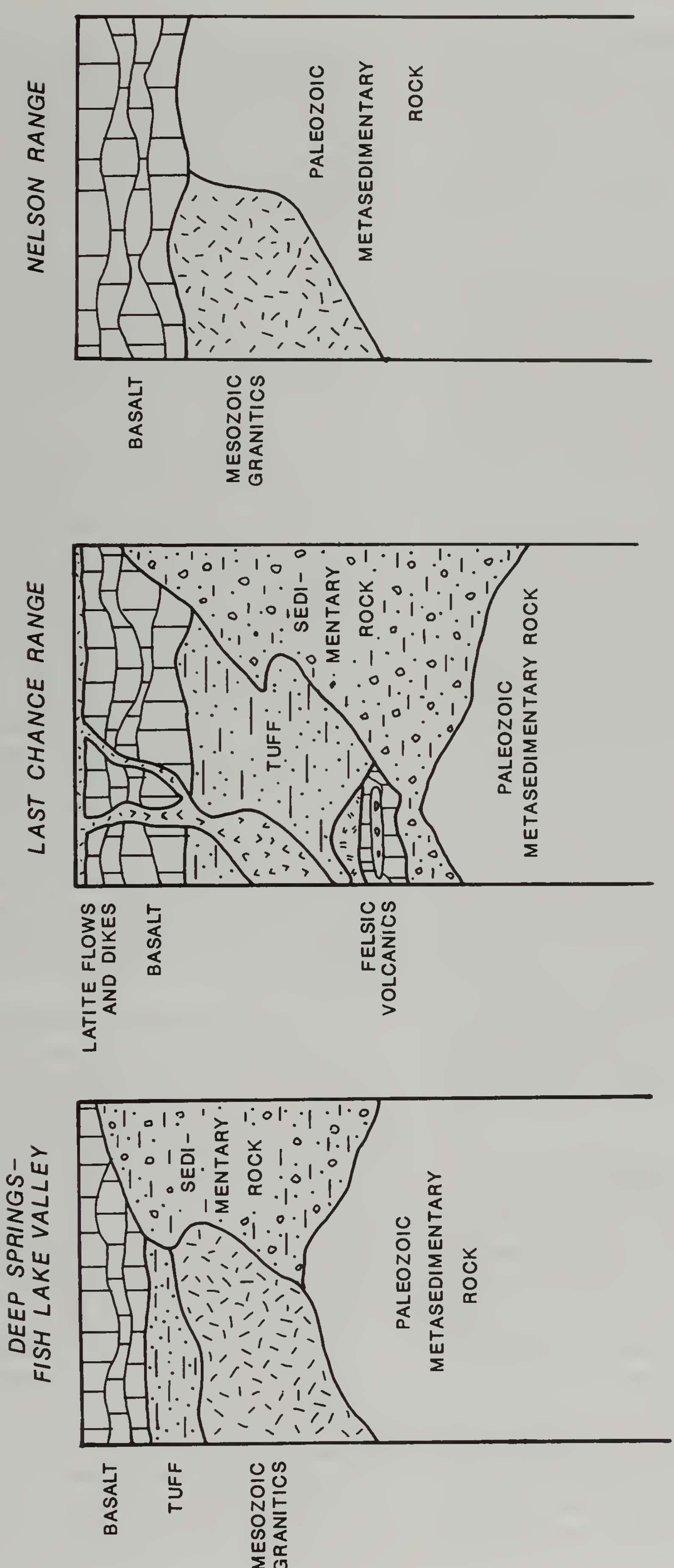

Figure 8. Tertiary sedimentary and volcanic rocks in the Eureka-Saline Valley study area.

fanglomerates and bedrock on the west and south sides of Eureka Valley, northern end of Death Valley and western side of Saline Valley. Alluvial gravels along the margins of Eureka Valley, Deep Springs Valley and Saline Valley grade into playa deposits and then into brine deposits in the lowest parts of the above mentioned valleys. The younger Quaternary deposits are unconsolidated alluvium and colluvium that are virtually undissected by erosion.

Structural Geology

The Precambrian and Paleozoic strata in the Eureka-Saline Valley SMARA study area were essentially flat lying and undeformed at the close of the Paleozoic era. During the Mesozoic these rocks were brecciated and folded by movement on low-angle faults and deformed by the intrusion of granitic plutons, and in the Cenozoic they were broken by basin and range faults. The rocks in the study area, therefore, have been subjected to the same tectonic events that have affected the western part of the basin and range province as a whole.

The rocks and alluvial deposits of the study area record a history of complex faulting. The oldest deformation that disrupted the Precambrian and Paleozoic age rocks resulted from the Last Chance thrust (Stewart and others, 1966). Exposures in widely-spaced windows reveal that the Last Chance thrust extends from the western part of the study area to possibly as far east as the California-Nevada stateline in the area southeast of Little Sand Spring (Stewart and others, 1966). The Last Chance thrust may extend farther west than the study area because the rocks in the Inyo Mountains are structurally continuous with known upper-plate rocks. Throughout the region, Upper Precambrian, Cambrian, and Ordovician strata at the sole of the upper plate rest on Mississippian rocks. The continuity of this relationship indicates that virtually all of the pre-Mesozoic rocks outside the windows and west of the Dry Mountain area are in the upper plate of the thrust, which is interpreted to have moved eastward for a distance of at least 20 miles (Stewart and others, 1966). The thrusting is considered to have taken place before emplacement of the Jurassic intrusives (Wrucke and others, 1984). Thrust faults in the Dry Mountain area are in the lower plate of the Last Chance thrust but probably are products of the same tectonic event (Wrucke and others, 1984).

Forceful emplacement of Jurassic plutonic rocks in the study area pushed aside and folded the adjacent stratified rocks. Precambrian and Cambrian strata were bowed into approximate parallelism with the contact of invading quartz monzonite at Joshua Flat (Wrucke and others, 1984), and along the eastern contact of the Hunter Mountain batholith. Effects of the intrusion of the Hunter Mountain pluton are evident as much as three miles from the contact; the degree of deformation, like the effects of contact metamorphism, diminish rapidly away from the intrusive contact (McAllister, 1955).

Basin and range faulting has been responsible for the present distribution of mountain ranges and valleys in the study area and for many of the faults in the mountains. The west side of the range in which Dry Mountain is located is the best example in the study area of topographic expression of a mountain front by a basin and range fault. This nearly linear fault separates bedrock from the adjacent fan gravel. Topographic relief along the west side of the range is nearly 5,000 feet. The Last Chance Range and some of the other mountain areas also rise sharply in places from the down-dropped valleys, but the faults that controlled the valleys and mountains are buried by alluvium (Wrucke and others, 1984).

The Saline Range, in marked contrast to the other mountain masses, is, in general aspect, a low broad dome whose surface is defined by Pliocene basaltic flows. The existence of this lava field and of the cinder cones aligned along north-northeast-trending faults that break the field are suggestive that extensional processes responsible for basin and range structural features in the study areas were active at the time the basalt was erupting and probably provided the mechanism for tapping deep magma sources. Geophysical evidence indicates that a valley connecting Saline and Eureka Valleys existed beneath the basalt in the northern part of the Saline Range and, therefore, that the crust at the site of the range has been the locus of crustal extension for at least 4.5 m.y. Remnants of basalt flows in the Last Chance Range 2,000 feet above flows in the Saline Range show that much of the present basin and range topography in the Saline Valley study area formed in the past 4.5 m.y. Faults in unconsolidated alluvium at numerous localities in Eureka and Saline Valleys and the deep valley west of Dry Mountain indicate that faulting is still active (Wrucke and others, 1984).

The Death Valley-Furnace Creek fault zone has offset upper Tertiary (?) and Pleistocene alluvial deposits along the eastern boundary of the Eureka-Saline Valley study area. Displacement along this well-known fault has been in a right-lateral sense and has resulted in cumulative offsets in Precambrian and Paleozoic bedrock of many miles (Stewart, 1967). Holocene fanglomerates on the east side of Death Valley are also cut by faults that parallel the Death Valley-Furnace Creek fault (Wrucke and others, 1984).

Geophysical Data In The Crater Mine Area

Three telluric and audiomagneto-telluric (AMT) traverses done by the U.S. Geological Survey in the Last Chance Range in the vicinity of the Crater mine show a northeast-trending zone of low electrical resistivity (Wrucke and others, 1984, p.11, 26-27). There is an abrupt boundary on the east side of the low resistivity zone between that zone and one of higher resistivity. This boundary is close to the location of the Crater mine and may represent a fault. The low resistivity may indicate the area where hydrothermal activity associated with the mineralization at the Crater mine is concentrated (Wrucke and others, 1984, p. 26).

During the current Division of Mines and Geology study, two east-trending electrical resistivity-induced potential (IP) traverses and three magnetometer traverses were obtained in the vicinity of the Crater mine in order to investigate the reported low resistivity zone in more detail (Figure 9). Line 1, located about 1,000 feet north of the Crater mine, is about 3,600 feet long, and line 2, located just north of the Crater mine, is about 4,000 feet long

Figure 9). A dipole-dipole configuration was used for the lectrical work and the dipole spacing (n) on both lines vas 400 feet. Readings were taken out to n=6 where posible. The magnetometer traverses have a station spacing f 100 feet. Two of the magnetometer traverses coincided vith the resistivity-IP lines. A third magnetometer traerse was obtained along a northwest-trending road west f the Crater mine, where a strong self-potential anomaly vas reported by the U.S. Geological Survey (Wrucke and thers, 1984, p. 26-27) (Figure 9).

A Geotronics model FT-4 transmitter with an output ated at 3.2 KVA, a Geotronics model B-2 engine generaor and a Geotronics Geomite model R401 IP receiver were ised for the electrical survey. A Geometrics model 816 otal intensity magnetometer was used for the magnetic urvey.

The results of the electrical resistivity survey show a harp change in resistivity near station 26 on line 1 from bout 2,000-3,000 ohm-feet, on the east, to 200-300 ohmeet, on the west (Figure 10). Similar results were obained on line 2 where the change occurs near station 30, ut the values of resistivity are lower on this line, ranging rom about 1,000 ohm-feet, on the east, to about 30-ohm eet, on the west. The change in resistivity observed on hese traverses is near the location of the Crater mine, nd it appears to be the same boundary mapped by the J.S. Geological Survey telluric data.

The values of induced potential for both lines 1 and 2 vere found to be very low (Figure 12). In fact, these values pproach zero except near the eastern edges of both traverses where small positive values were measured There was no apparent increase of IP effect with depth on either profile, although the depth of investigation should have exceeded 1,000 feet on both profiles. This result indicates that there are practically no metallic sulfides or clay minerals in the area at least to the depths investigated. However, certain sulfides such as cinnabar, which could be present in this area, have a poor IP response and might not be detected by this method.

The magnetic data given in Figures 10,11, and 13 show essentially no local anomalies except possibly for line 1 (Figure 10). However, some of the small anomalies on line 1 actually may be caused by nearby metal objects left over from the mining operations. The apparent lack of magnetic anomalies indicates that there is very little magnetite present in the rocks in this area.

Marsh (1986, p. 198) suggested that the deposit at the Crater mine represents a vapor-dominated, mineralized hydrothermal system and that there is a high potential for a significant gold occurrence at depth in this area. Although the resistivity low could indicate hydrothermal alteration and/or sulfide mineralization in the area near and to the west of the Crater mine, the IP data do not confirm the suggestion. The resistivity low also could indicate conductive ground water in a faulted or fractured area. However, it is possible that this geophysical survey did not extend to a depth that was great enough to detect any sulfide or clay minerals that may be present.

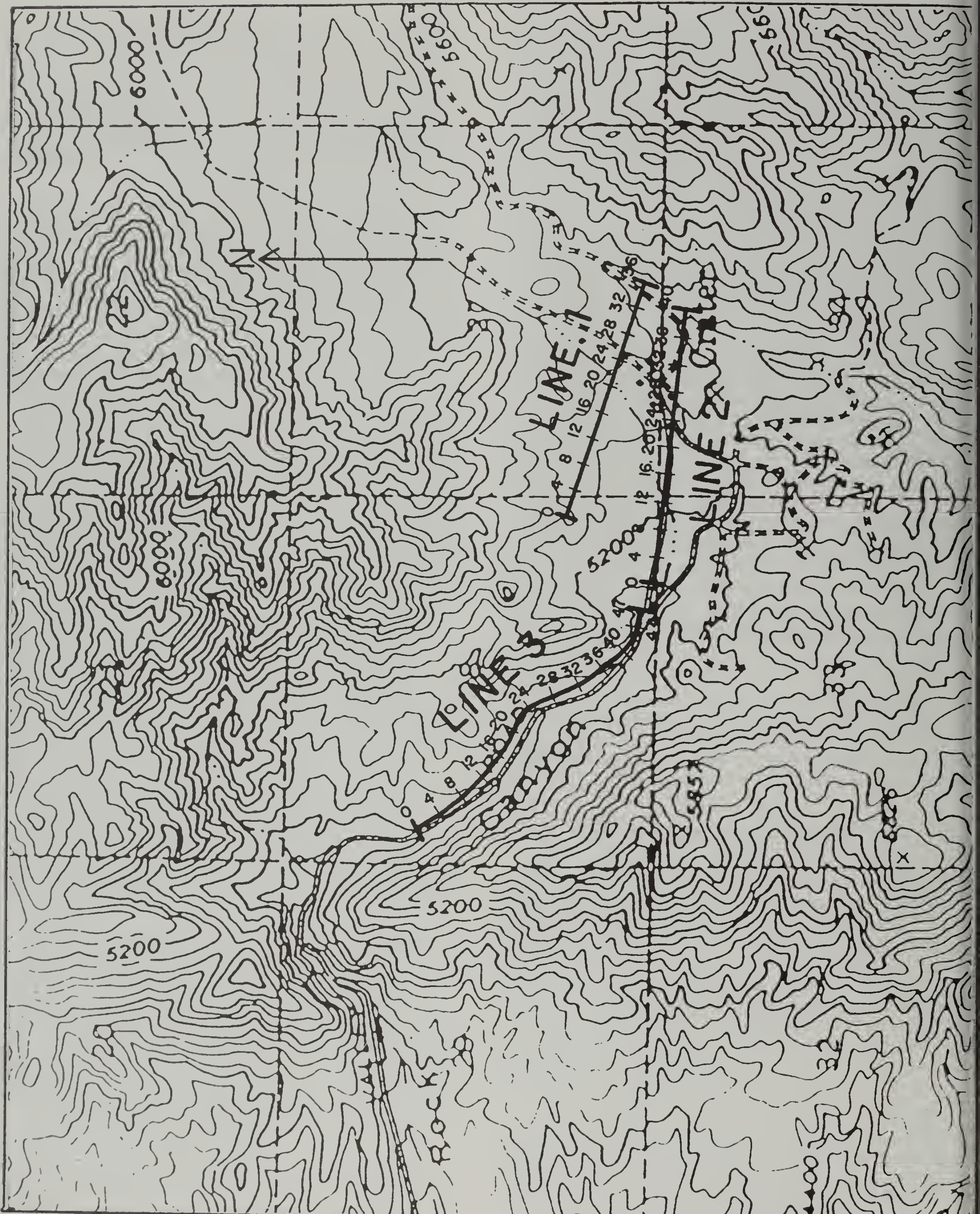

Figure 9. Map showing locations of DMG geophysical traverses in the vicinity of the Crater mine, Inyo County, California, scale 1:24,000

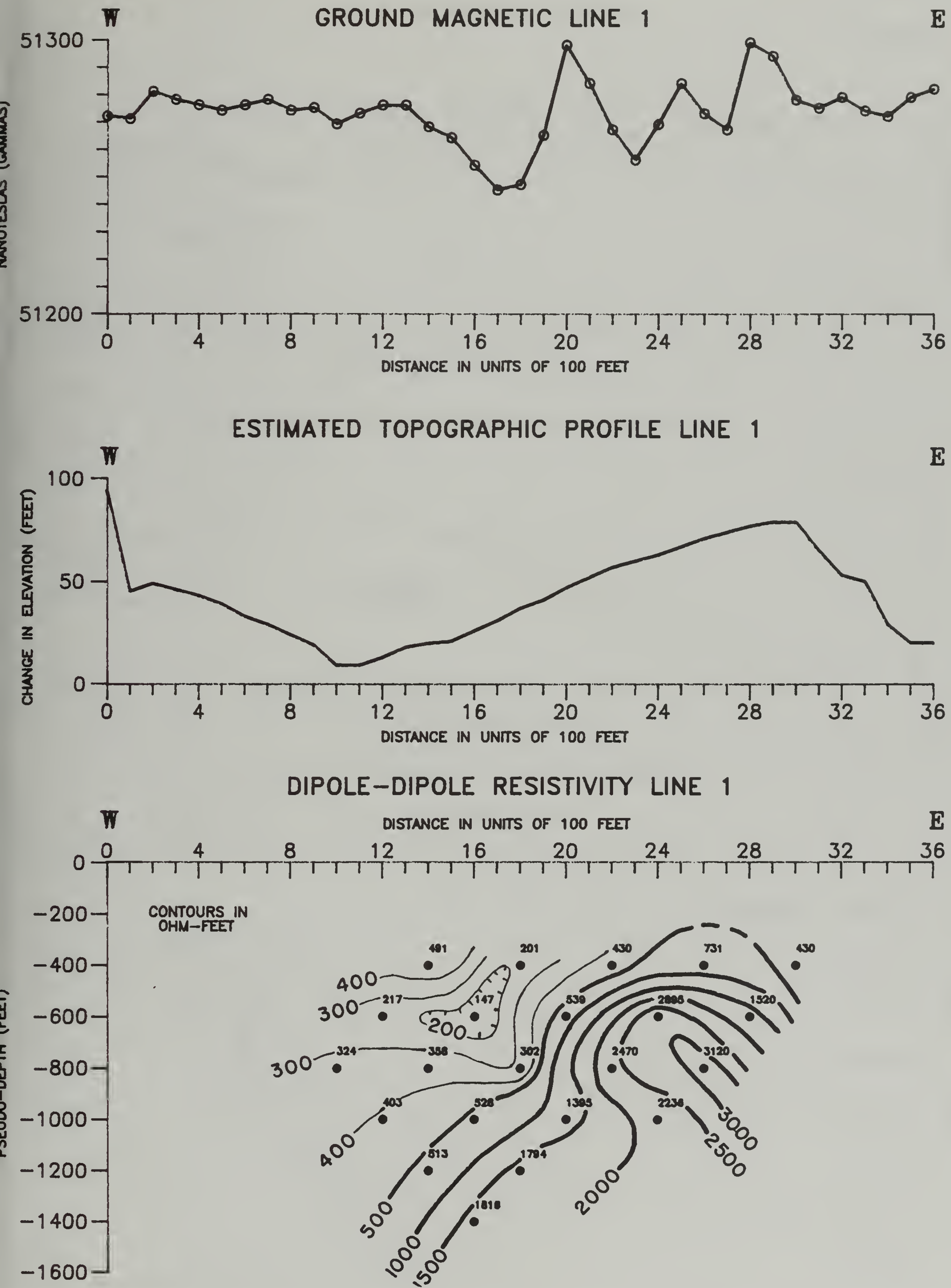

Figure 10. Total intensity ground magnetic profile, dipole-dipole electrical resistivity pseudosection, and estimated topographic profile, line 1, Crater mine area.

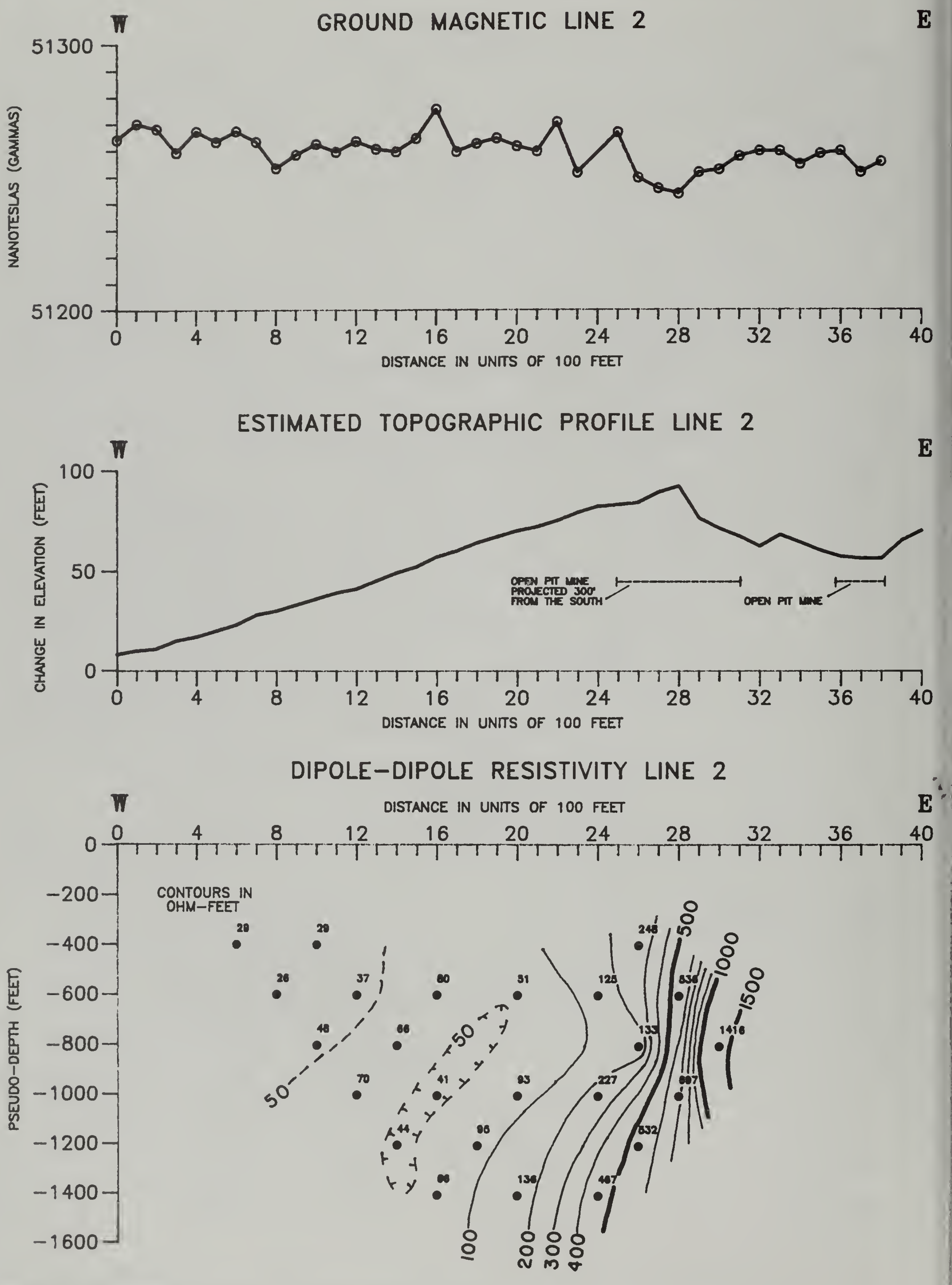

Figure 11. Total intensity ground magnetic profile, dipole-dipole electrical resistivity pseudosection, and estimated topographic profile, line 2, Crater mine area.

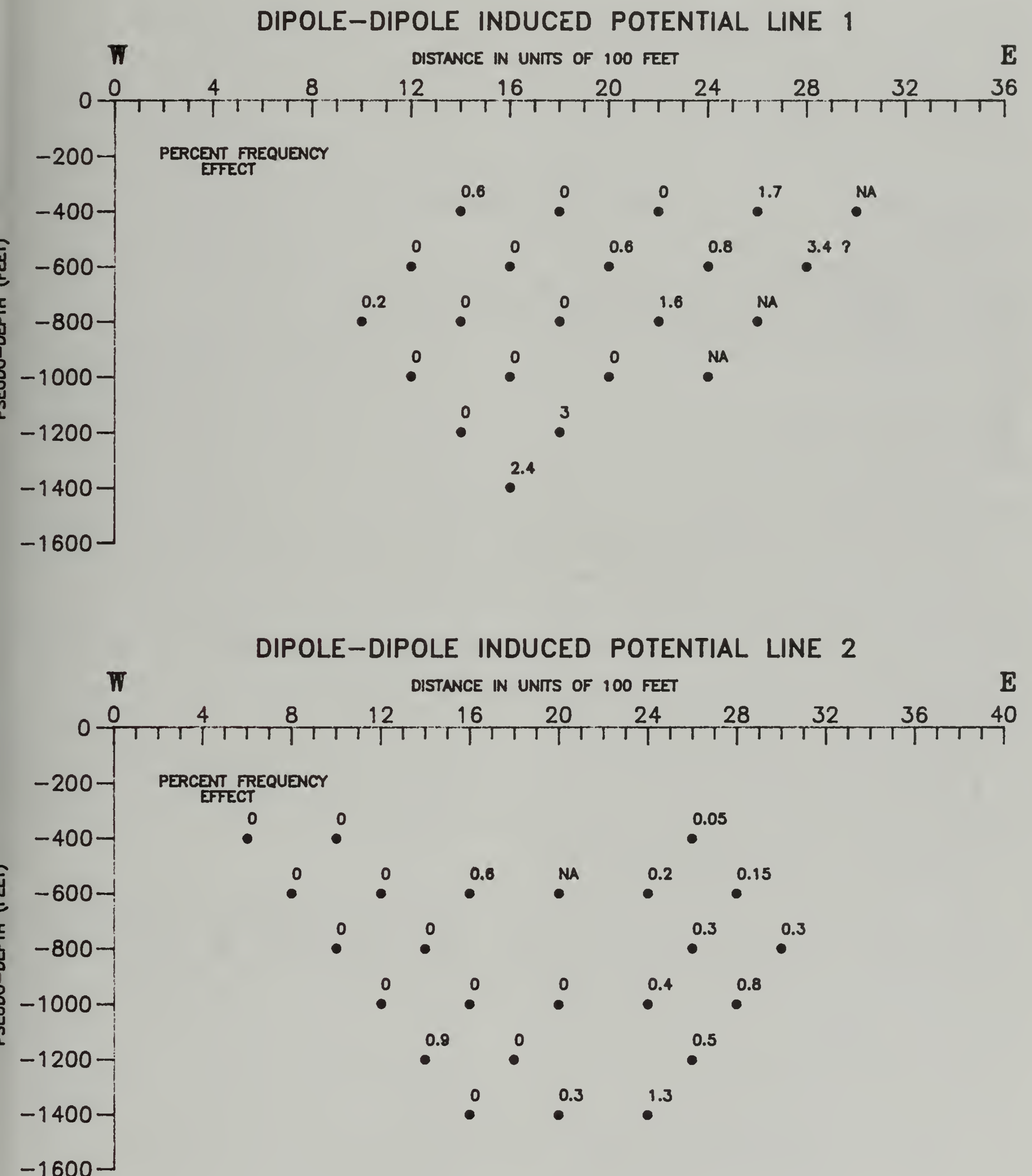

Figure 12. Induced potential pseudosections, lines 1 and 2, Crater mine area.

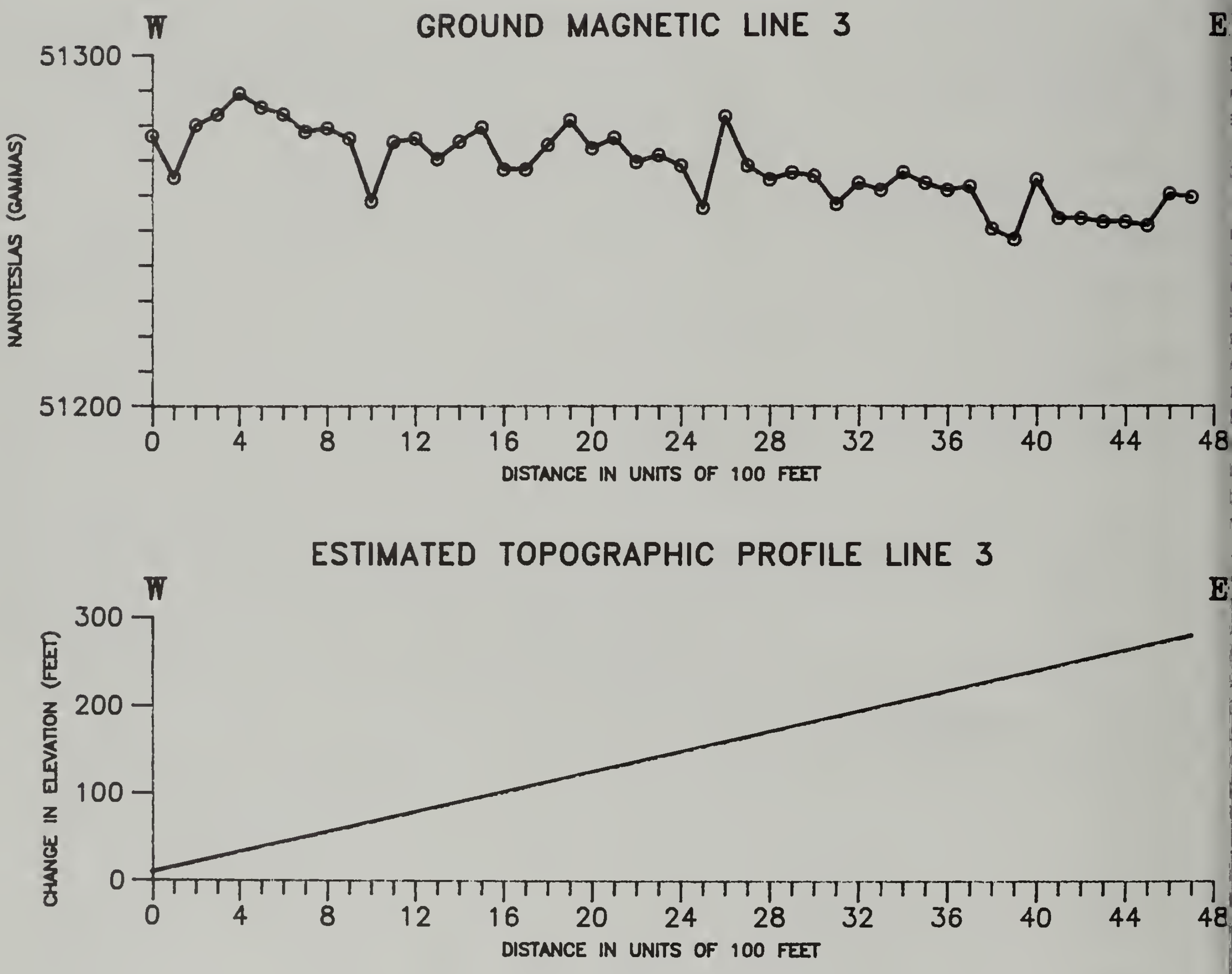

Figure 13. Total intensity ground magnetic profile and estimated topographic profile, line 3, Crater mine area.

PART III - MINERAL RESOURCE ASSESSMENT

MINING HISTORY

Prospecting in the region of Saline Valley, Eureka .lley, and Deep Springs Valley probably began in the .e 1850's as mineral discoveries were made in the Inyo ountains as early as 1859 (Chalfant, 1933); mining tivity is documented by 1861 in the southern end of the nite Mountains (Clark and Clark, 1978). The rich sil-r-lead deposits at Cerro Gordo in the Inyo Mountains e reported to have been discovered during the period 61-1866 (Merriam,1963). Several mines, the Cliff, braltar and Cinderella, located along the northwestern le of Deep Springs Valley, were being developed and e production was recorded by 1863 (Burchard, 1880; odyear, 1888).

By the 1870's, numerous mines adjacent to Deep rings Valley were being operated, including the Cali-nia, Oasis, Piper, Copper Queen, Greenly, and nitman (Burchard, 1880). Within the Inyo Mountains, e Beveridge Mining District was organized in 1877, d the town of Beveridge was settled in 1878 and occu-d until the early 1900's with around 35 gold and silver nes operating intermittently during this period (Close, 85). Several mines in the eastern foothills of the Inyo's re discovered between 1879 and 1907, including the al, Bedell, Waucoba, Scheelite, Bunker Hill, Blue nster and Loretto (Goodyear, 1888). The Loretto mine, veloped by an 1,800 foot-deep shaft during the period 07-1915 (Waring and Huguenin, 1917), was patented 1922 and reactivated in 1975 as an open pit. The sil-, lead, zinc, copper, and gold deposits in the Ubehebe strict (Panamint Range) were being worked in the rly 1900's. First recorded production from the Ubehebe strict was of silver from the Ubehebe mine in 1908. e Lippincott mine was worked for lead and silver as rly as 1908 and operated intermittently until the early 50's (McAllister, 1955). The Blue Jay mine produced gh-grade copper and silver ore in 1915 (McAllister, 55).

The silver- and lead-bearing quartz veins at the Lee, l, August, Ruby Port, Emma, Hillside, and Morning ar prospects in the Whippoorwill Flat-Jackass Flats re prospected probably before 1900 with some minor oduction recorded in 1968 from the Morning Star rucke, 1984; McHugh, 1984).

Placer gold was discovered in Marble Canyon before 04, but substantial development did not begin until 34. Approximately 20 shafts were sunk to bedrock; and hough production was mostly unrecorded, at least 329 nces of gold and 22 ounces of silver were recovered m more than 7,300 cubic yards of gravel between 1936 d 1960 (Tucker and Sampson, 1938; McHugh, 1984). veral placer mines were still being prospected in 1985 thin Marble Canyon. Large claim blocks in the Last ance Range and southeast of Little Sand Spring have en explored for possible epithermal gold deposits and re still under active claim at the time of writing this port.

Mines within the Beveridge district have been the focus of renewed activity over the last several years, with most, if not all, old properties being under active claims. An attempt was made in 1983 by Far West Exploration to bring the Keynot into production when the company flew a 250-ton-per-day cyanide gold recovery plant in by helicopter and began mining the dump. Operations were suspended later in the year.

Cinnabar was discovered in 1966 at the El Capitan mine, located two miles north of the Crater sulfur mine. The mine produced 3,400 flasks of mercury from 1968 to 1970 (Hill, 1972). Cinnabar occurrences south of Crater along the crest of the Last Chance Range were being mined until 1971. Mining activity occurred at the time of high mercury prices, $536 per flask in 1968; activity in the area ceased when prices dropped to under $300 per flask in 1971.

Tungsten has been reported to have been produced from several mines: the Scheelite Group is credited with 400 pounds of 40 percent scheelite in 1906 (Waring and Huguenin, 1915), mines in the Ubehebe District around Dodd Spring-Hunter Mountain area were reported to have had several hundred pounds of high-grade scheelite production in 1915 (Waring and Huguenin, 1915), the Waucoba Tungsten mine operated from 1939 to 1942 (Norman and Stewart, 1951), and several prospects in the Sylvania Mountains and north of Willow Spring reportedly operated when price subsidies on tungsten during World War II and the Korean conflict were in effect.

Beginning in 1960, exploration for porphyry-type molybdenum deposits became active in the Sylvania district and was centered around the Cucomungo prospect near the head of Alum Canyon along the California-Nevada state line (Schilling, 1977,1979). A succession of major exploration companies examined this area up through the 1970's, and in 1977 Marathon Oil Company claimed and initiated drilling on their stateline molybdenum porphyry deposit. The property at the time of writing was held by Marathon but never brought into production.

Interest in the non-metallic deposits within the study area began in 1864 when the salt deposits in the Saline Valley playa were discovered (Bailey, 1902). They were not developed until 1913 when an aerial tramway was constructed which operated until 1930 to haul salt from Saline Valley across the Inyo Mountains to a terminus at Swansea on the east shore of Owens Lake (Ver Planck, 1958). Borax was discovered in 1874 in surficial playa deposits in Saline Valley and recorded production from 1895 to 1907 (Gale, 1914).

Substantial deposits of sulfur were discovered in the Last Chance Range in 1915 with production beginning in 1929 at the Crater mine and continuing intermittently until 1969 (Lynton, 1939; Stinson, 1984).

Talc deposits along the western borders of Eureka and Saline Valleys were known by the early 1900's. The Victor Consolidated mine, located as a gold prospect in

1909, was patented in 1912 and later operated as a talc mine. The Nikolaus-Eureka mine produced about 75,000 tons of steatite-grade talc during intermittent operations from 1945 to 1970. The Harlis and Broady mine produced 31 tons of talc in 1957 (McHugh, 1984). The talc deposits in the Inyo Mountains west of Saline Valley (Willow Creek, Eleanor, Snowflake, Grey Eagle and White Eagle) have been active since the early 1940's. Approximately 50,000 tons of high-grade talc had been produced by 1979 (Wrucke, 1984). Currently, only the White Eagle is active, with production of 2,000 to 3,000 tons a year being recorded for use in cosmetic and ceramic tile manufacture.

Minor amounts of limestone, dolomite and wollastonite have been produced on properties in the Inyo Mountains and Panamint Range, respectively.

MINERAL LAND CLASSIFICATION

The Blanco Mountain, Dry Mountain, Last Chance Range, Magruder Mountain, Marble Canyon, Mt. Barcroft, New York Peak, Piper Peak, Soldier Pass, Ubehebe Crater, Ubehebe Peak, Waucoba Mountain, Waucoba Spring, and Waucoba Wash 15-minute quadrangles are classified for the presence or likely occurrence of metallic and industrial mineral resources.

Consideration is given to all non-fuel minerals of economic importance (exclusive of sand, gravel, and common rock) by determining what genetic classes of mineral deposits are likely to exist in the area. Only those genetic classes for which direct or indirect evidence indicates the presence or likely occurrence of significant deposits are addressed in the mineral land classification report. However, other types of deposits may exist which, because of lack of evidence, are not presently recognized.

Mineral land classification is based on recognition and delineation of geologic environments present in an area and determination of those genetic types of mineral deposits likely to be hosted in those environments. In all, ten distinct genetic types of mineral deposits are recognized worldwide:

1. Magmatic concentration deposits
2. Contact metasomatic deposits
3. Hydrothermal mineral deposits (exclusive of volcanogenic deposits)
4. Exhalative volcanic deposits (volcanogenic)
5. Deposits formed by sedimentation
6. Deposits of bacteriogenic origin
7. Evaporates
8. Residual and mechanical concentrations
9. Deposits formed by metamorphism
10. Industrial mineral deposits formed by diverse processes.

Of the ten genetic classes listed above, six are judged to be, or likely to be, present in the project area. These are as follows:

1. Deposits formed by hydrothermal processes (base and precious metals) - Plate 2A and 2B.
2. Deposits formed by contact metasomatism (tungsten, molybdnum, iron, and associated metals) - Plate 2A and 2B.
3. Deposits formed by residual and mechanical concentrations (placer gold) - Plate 2A and 2B.
4. Deposits formed by evaporative processes (salt, sodium compounds and borates)-Plate 3A and 3B
5. Deposits formed by metamorphism (talc and wollastonite) - Plate 3A and 3B.
6. Industrial mineral deposits formed by diverse processes (carbonate rock, quartzite, sulfur and pozzolan) - Plate 3A and 3B.

AREAS CLASSIFIED FOR HYDROTHERMAL MINERAL DEPOSITS

Areas Classified as MRZ-2b

Eastern Inyo Mountains, MRZ-2b$^{(h-1)}$: This area is located along the eastern escarpment of the Inyo Mountains and represents an area underlain by gold-bearing quartz veins occuping fractures in granitic rocks and silver-lead-zinc-bearing quartz veins associated with the faulted contact zone between quartz monzonite and calcareous metasedimentary beds (Tucker 1926, Close, 1985). This area of mineralization as a whole, rather than individual mines or veins, was classified as MRZ-2b because of the overall continuity of the system and the extensive nature of mineralization throughout the area as demonstrated by historic mining activity.

The historic mining is not likely to have depleted the gold and silver resources. This reasoning is based on: (1) most gold mining in the Beveridge District was done by crude hand methods. Burchard (1883) describe the early mining as follows:

"The Mexican system of mining, crude and simple and working for immediate results, has done nothing to settle the great question as to the extent and permanence of these deposits. In several canyons and along streams of water they have erected a number of crude arrastras, with which they occasionally and spasmodically reduce the richest ore they crevice from the paystreaks of adjoining ledges, and the fact they frequently have large clean-ups by so crude a process indicates a marvelous richness of ore."

When the richest, free-milling ore was depleted, mining stopped, leaving the veins that required sophisticated higher cost mining and milling methods. Selective mining was necessary because of the lack of means to transport large quantities of ore and equipment. In the early days this problem was partially solved by use of burros and the construction of burro trails. This solution, however, soon became inadequate because it paid to transport only the highest grade ore of more than 6 ounces of gold per ton (This ore grade was extrapolated from reports published by the Director of the U.S. Mint (Burchard 1880,1881, 1883), from examination of U.S. Bureau of Mines production and smelter return records and from assay data of dump material that averages 1 to 3 ounces of gold per ton, yet was not transported via burros for milling (Close, personal communication, 1988);

d this type of ore soon ran out. Additionally, only all milling equipment could be brought into the dis- ct; consequently, a few small, inefficient mills were ilt to process the ore. The chief recovery method used these mills was amalgamation with only about 50 per- it of the gold being saved. Roads, providing better nsportation, were never built and today the area re- ins accessible only by helicopter or by foot;

a USBM Mineral Resource Study performed in 1985 the Inyo Mountain Wilderness Study Area that iden- ed five gold (Keynot mine, Big Horn mine area, Tay- -McElvoy mine area, Beveridge mine, and the Gavalan ne area) and three silver properties (Big Silver, Silver rvest prospect and Morning Sun prospect) that con- n about 4.4 million tons of inferred gold resources and),000 tons of silver resources. The gold-bearing veins ntified contain about 1.1 million ounces of gold and million ounces of silver, and the silver veins contain additional 2 million ounces of silver for a total worth $578 million at a gold price of $425 per ounce and a ver price of $11.50 per ounce (Close, 1985);

in addition to the above properties that the USBM dy delineated as containing inferred gold and silver erves, 30 additional properties within the Beveridge strict were identified by the USBM as containing sig- icant gold and silver mineralization that probably pported historic precious metal production (Close, 35). Within the Beveridge District, individual gold- aring veins are as thick as 8.5 feet, as long as 4,200 t, have been fractured and squeezed by movement ng the enclosing structures, and most veins have been placed by cross faults. With the exception of the ynot and Big Horn mines, other properties have very le vertical mine development. The vertical continuity nost veins is unknown within the Beveridge District, hough the Keynot veins are discontinuously exposed m the mine southeastward to the bottom of Keynot nyon, a vertical elevation of 1,000 feet. Thus, it is pos- le that near-surface low grade precious metal mineral- tion could become enriched with depth; and

the fact that the mines in the Beveridge District led to sustain production after 1906 was not because an overall shortage of ore, but because it was not ssible to sustain production of ore that could average er 6 ounces per ton gold in order to be transported by ck to small amalgamation mills. Between 1906 and 10 several small cyanide mills were erected near wa- sources within the area; however, all failed due to h costs associated with small size of the milling op- itions. Thus, taken in context of the area's virtual ccessibility, additional information regarding re- ves of individual mines within the area would, in all bability, upgrade the classification of several mines d localities to MRZ-2a.

Cerro Gordo Mine Area, MRZ-2b $^{(h\text{-}2)}$: The Cerro rdo mine was California's leading silver and lead pro- cer in a decade of active mining which followed the il War. Discovered by Mexicans in 1865 or 1866 alfant, 1933; Knopf, 1918) and beginning in 1869, the al recorded silver yield is nearly 4,400,000 ounces and al lead production roughly 37,000 tons (Merriam, 1963). Of these totals, more than half of the lead and about three-fourths of the silver were produced in the boom years from 1869 through 1876. Gold was an important smelter by-product with about 2,000 ounces being produced. Beginning with 1911, total zinc production has been about 12,000 tons and copper production about 300 tons (Merriam, 1963).

Rocks of the Cerro Gordo area are extensively folded and faulted. The most significant structural feature is the large, asymmetrical, south-plunging Cerro Gordo anticline which forms a sort of backbone to the Inyo Mountains. On its flanks and crest are irregular subsidiary flexures. Bordering the major anticline are many smaller folds with northwest axial trends. These range greatly in magnitude and tightness, partly in response to varying competency of strata involved. Some of the folds are related to reverse faults or thrusts. The Cerro Gordo mine is situated in the axial zone of the anticline which carries its name. Faults having a northerly trend are characteristic of the region. Among these is the important Cerro Gordo fault, master fault of the Cerro Gordo mine. Northwestward-trending normal faults greatly complicate geologic structure in the Cerro Gordo mine, where many offset ore bodies.

Ores of the Cerro Gordo mine occur in Devonian marble of the Lost Burro Formation on the east or footwall side of the northward-trending Cerro Gordo fault. This fault is seemingly normal and carries Mississippian Chainman Shale down on the west against marble of the Devonian Lost Burro Formation. The largest ore bodies were found in two channels which rake steeply to the south, which is the plunge direction of the Cerro Gordo anticline. The two principal ore channels, known as the Union chimney on the north and Jefferson chimney on the south, occur in fractured marble close to the master Cerro Gordo fault. They were fed by fissures which formed in sympathy to movement on the master fault. Major ore bodies also occurred in the sheared Jefferson diabasic dike. Quartz veins with northwest strikes yielded siliceous ores of silver, lead, and copper. Carbonate-zinc ores are secondary, derived by leaching of sulfide ores in the Union chimney vicinity. Supergene zinc-carbonate ores replaced unmineralized Lost Burro marble along bedding. In the lower part of the Union chimney, primary sulfide replacement was also controlled in part by bedding (Merriam, 1963).

The Union ore channel was bottomed near the northwestward-trending San Felipe siliceous vein where the vein lies against a dacite porphyry dike. The very steep Jefferson chimney extended to a much greater depth but was cut off below the 900 level by northwest-trending normal faults. Ore in the Despreciada section of the mine may represent faulted, deeper parts of the Jefferson chimney.

South of Cerro Gordo, the Morning Star mine, the Charles Lease tunnel, and the 8,100-foot, low-level Estelle tunnel were opened to explore the Castle Rock siliceous vein and ground beneath gossans in the Tin Mountain Limestone. The Estelle also provided means of searching for inferred deep continuations of the rich Cerro Gordo ore channels. Morning Star and Estelle production was small while production of the Morning Star came principally from the Gold stope in Lost Burro marble. Estelle ore was mined near the tunnel level from upper Hidden Valley Dolomite east of the Cerro Gordo anticline axis.

Among lesser mines, the Ella, the Perseverance, and mines in Belmont Canyon yielded siliceous, silver-bearing ores used as fluxing material in the Cerro Gordo furnaces. These mines are in a zone of northwest shearing, which include northwestward-trending quartz veins of the tetrahedrite-galena-barite type that are characteristic of the region.

West of Cerro Gordo the now inaccessible Ignacio mine lies in altered and intruded Chainman Shale near the boundary with overlying silicated limestone of the Keeler Canyon Formation. Principal Ignacio silver production seems to have come from a fissure zone along the northeastward-trending Ignacio fault. The westernmost mine of the Cerro Gordo area is the Sunset, which lies in partly silicated limestone of the Keeler Canyon Formation. A small amount of lead and silver came from two narrow intersecting veins (Merriam, 1963).

Important ore discoveries have twice revived Cerro Gordo. Neither occasion approached the richness or quantity of ore that was extracted during the bonanza period. During the period 1911 to 1919, Cerro Gordo was a source of the highest grade zinc carbonate ores produced in this country. By 1925, an important silver-lead ore body was found in the La Despreciada claim which supported production until 1933. After 1933, small leaser activity continued and further examination of the old Cerro Gordo workings was conducted by geologists. During World War II, the mine was opened for examination, sampling and diamond drilling by Goldfields of South Africa in 1944. Although encouraging lead seams and possible Jefferson dike drag ore were found, no minable ore body was found. W.E. Rigg and Associates conducted drilling and exploration drifting from 1946 to 1949 with limited results (Merriam, 1963). Since the 1940's, the property has been examined by several mining companies, none of which resulted in any recorded production. Since 1985, a Canadian company, Asamera Minerals (U.S.), Inc., has taken an option on the property and has initiated a drilling program centered around the Morning Star mine. The company's interest has been in gold mineralization, instead of lead-silver. Preliminary results have been favorable from over 20,000 feet in 70 surface holes and drilling is currently (1987) taking place.

Last Chance Range Area, MRZ-2b [(h-3)]: This area is located in the northern part of the Last Chance Range and possesses certain geologic and geochemical features that suggest a high potential for disseminated epithermal precious metal mineralization.

Disseminated epithermal gold deposits commonly are of large size and low grade. They are thought to have formed in near-surface parts of hot springs systems or in hydrothermal cells where meteoric waters have merged with rising fluids in zones of high heat flow (Berger and Eimon, 1983; Silberman, 1982). Shallow intrusions, commonly of felsic composition, provide the heat necessary to drive the hydrothermal systems. Silicification and evidence of hydrothermal brecciation may be extensive and may be accompanied by argillic alteration. High-grade disseminated deposits commonl[y] have undergone multiple episodes of brecciation and mineralization (Berger and Eimon, 1983). A common characteristic of epithermal gold deposits is the presence of anomalous concentrations of arsenic, antimony and mercury introduced during mineralization. This suite of elements and, in some cases, high concentrations of barium, thallium, tellurium, tungsten, silver, and other metals are found in the ore zone of disseminated gold deposits and near the surface in epithermal precious metal systems (Erickson and others, 1966; Radtke and others, 1980; White, 1981; Berger and Silberman, 1985). Disseminated gold deposits often in faulted volcanic or sedimentary rocks. The Carlin deposit, developed in fractured thin-bedded Silurian and Devonian carbonate rocks is north-central Nevada, is perhaps the best-known example of this type of deposit in carbonate rocks.

Geochemical sampling performed by the USGS in 1981 during the course of the Saline Valley WSA Study revealed that the characteristic geochemical suite of arsenic, antimony, and mercury occurred in highly anomalous concentrations in stream-sediment samples from streams draining the Last Chance Range. Rock samples from four mercury properties — Up and Down, Rebecca, Eureka and Storm Cloud — that lie immediately south of the Crater mine recorded gold values ranging from 0.006 to 0.26 ounces of gold per ton (Wrucke, 1984). Additional detailed geochemical sampling by two private exploration companies, Marathon Exploration and Intermountain Resources (Watson, 1984), delineated two other areas possessing gold mineralization, and Marsh (1984) collected and analyzed 173 samples to formulate his depositional model (Figure 14).

The Crater mine area has been the locus of intense hydrothermal alteration. This alteration, consisting of mixture of sulfur, gypsum, and siliceous sinter, is the result of processes related to the vapor phase of a hot spring system percolating upward through limestones and dolomites. Even in the most intensely altered areas, relict bedding and structures of the original limestone and dolomite are preserved. Near orifices and vents, silicification and microbrecciation are more intense. Throughout the Crater area, sulfur, gypsum, an[d] silica-bearing sinter vents are found along major fault zones. These observations are consistent with the vapor-dominated hydrothermal system model described b[y] White and others (1971), in which more water is boiled off than inflow can replace. Regions around these systems are high in sulfate and may be bleached and lacking in vegetation.

The chemistry of rock samples taken from these highly altered areas is also consistent with this model, as they are depleted in gold, silver, arsenic, antimony, an[d] tungsten and enriched in mercury. Mercury is often separated in these vapor-dominated systems because of its high volatility (Marsh, 1986).

Initial examination of the trace-element chemical a by Marsh (1986) indicated a possibility of two miner- ation periods. The first (and earliest) was a base-metal emblage of copper, lead, zinc, and molybdenum con- ing some gold and silver related to the Cretaceous ramide?) igneous activity that is prevalent north and th of the Crater area. The second was the trace-ele- nt suite commonly found in gold deposits of arsenic, mony, tungsten, and silver related to the geologically nger (Miocene ?) Crater hydrothermal system.

Two distinct types of mineralization were identified in field: (1) the highly altered areas of sulfur, gypsum, siliceous sinter along faults in the eastern limestone- omite rocks and (2) mineralized fractures, faults, and s in the western siliceous section. To help define the e-element relations, the rock samples were divided three groups: samples taken from predominantly estone-dolomite terrane, samples taken from predomi- tly siliceous terrane, and samples taken from shales. hough the natures of these rocks are dramatically dif- nt, both geologically and chemically, the trace-element es remained consistent, showing only some notable erences in intensity (Marsh, 1986).

The Crater hydrothermal system is a vapor-phase em (Figure 14), which means that the trace-element malies from the suite associated with gold deposition nd around the sulfur, gypsum, and silica-altered areas less intense in most metals, with mercury being the ption. The fact that the base-metal suite is essentially ent in the sulfur, gypsum, and silica-altered rocks ls credence to the theory of two mineralization periods. itional evidence for an earlier period of mineralization hat some of the north-south faulting in the eastern eous rocks (where the base-metal anomalies are most nse) extends northward to the Cretaceous intrusive s (Marsh, 1986).

Geochemical sampling of 250 rock chip samples per- ned in the course of field work by Intermountain Re- rces on their Felise prospect revealed two areas that e anomalous values in gold, silver, arsenic, antimony, mercury, associated with zones of argillic alteration jasperoid breccias. Coincidentally, both areas are in act with the Last Chance thrust, and values as high 50 parts per billion (ppb) gold were identified near the ist (Watson, 1984).

Geochemical sampling by Marathon Resources on r Hermit Creek project, also revealed anomalous gold es as high as .28 ppm associated in close proximity to parallel with the strike of the Last Chance thrust.

El Capitan Mercury Mine Area MRZ-2b (h-4): Mer- is known at numerous localities in the northern part e Last Chance Range and at one locality in the Saline ge. The largest mercury mine in the region is the El itan, located 2 miles north of the Crater mine. The El itan is a Late Tertiary to Quaternary hot spring de- t where cinnabar and metacinnabar occur in close ciation with gypsum of hydrothermal origin. Accord- to Hill (1972) cinnabar has been sufficiently concen- ed at the mine to form relatively small, but high- le, mercury ore bodies, consisting of three distinct s of ore: (1) Gypsum ore averaging 10 pounds of mer- cury per ton consisting of cinnabar stringers and minor amounts of native sulfur, quartz, and hematite occurring in massive gypsum along two subparallel generally north-south-trending veins along a shear zone beneath the west open pit; (2) Silica ore averaging 15 pounds of mercury per ton consisting of cinnabar disseminated in an unconsolidated, pulverulent aggregate composed predominately of euhedral, microscopic to submicroscopic doubly-terminated quartz crystals and traces of clay, magnetite, and various other minerals occurring mainly in the area of the west open pit in hot spring conduits or pipes that formed entirely within the gypsum, also along gypsum-dolomite contacts, and entirely within the dolomite near gypsum-dolomite contacts, and (3) Nodular calcitic ore averaging 20 to 23 pounds of mercury per ton consisting of cinnabar in two types of roughly spherical to ellipsoidal nodules and their surrounding uncemented matrix. The nodules and matrix between the nodules consist of dolomite wall rock fragments, quartz, minor opaline and/or chalcedonic silica and argillaceous and calcite cement, with or without mineral and rock fragments and traces of native sulfur; many nodules consist entirely of chalcedonic and/or opaline silica. The nodular calcitic ore occurs in irregular solution channels and in one large solution conduit, occurring along the gypsum-dolomite contact in the east open pit.

The two largest gypsum masses in the area occur at the mine and are well exposed in the east and west open pits and in the mine workings below the east and west pits. They are associated with two zones of fractured and brecciated dolomite and dolomitic limestone of the Bonanza King Formation. Smaller isolated gypsum masses are exposed along faults in the area northwest to northeast of the mine.

Hydrothermal solutions presumably associated with magmatic activity ascended through permeable zones resulting from faulting and concurrent fracturing of the brittle carbonate host rock. Fracturing of the host rock occurred at the intersections of shears associated with two fault zones, one trending generally east-west and the other trending generally north-south. Breccia pipes formed along single shears and at the intersections of subparallel shears of the north-south trending fault zone and at the intersection of shears of both the north-south and the east-west fault zones.

Originally discovered as a sulfur prospect in 1952, the property was inactive until 1966 when, during exploration for sulfur, cinnabar was accidently discovered in a dozer cut and 89 flasks were produced. The mine and mill at Tehachapi were purchased by El Capitan Mercury Company in 1967 and from January, 1968 to May, 1970, 3,400 flasks of mercury were produced from the property (Hill, 1972). Leased by Quad Metals Corporation in 1970, additional exploration work was performed but failed to define additional high-grade near-surface breccia pipes, which, in conjunction with a precipitous drop in the price of mercury, led to the property becoming inactive by 1971.

Alum Canyon - Ace Hills Area, MRZ-2b (h-5) :In the Magruder Mountain - Sylvania Mountains area of Esmeralda County, Nevada, three molybdenum occurrences have been known and actively explored since about 1960 (Schilling, 1962). These deposits were known as the

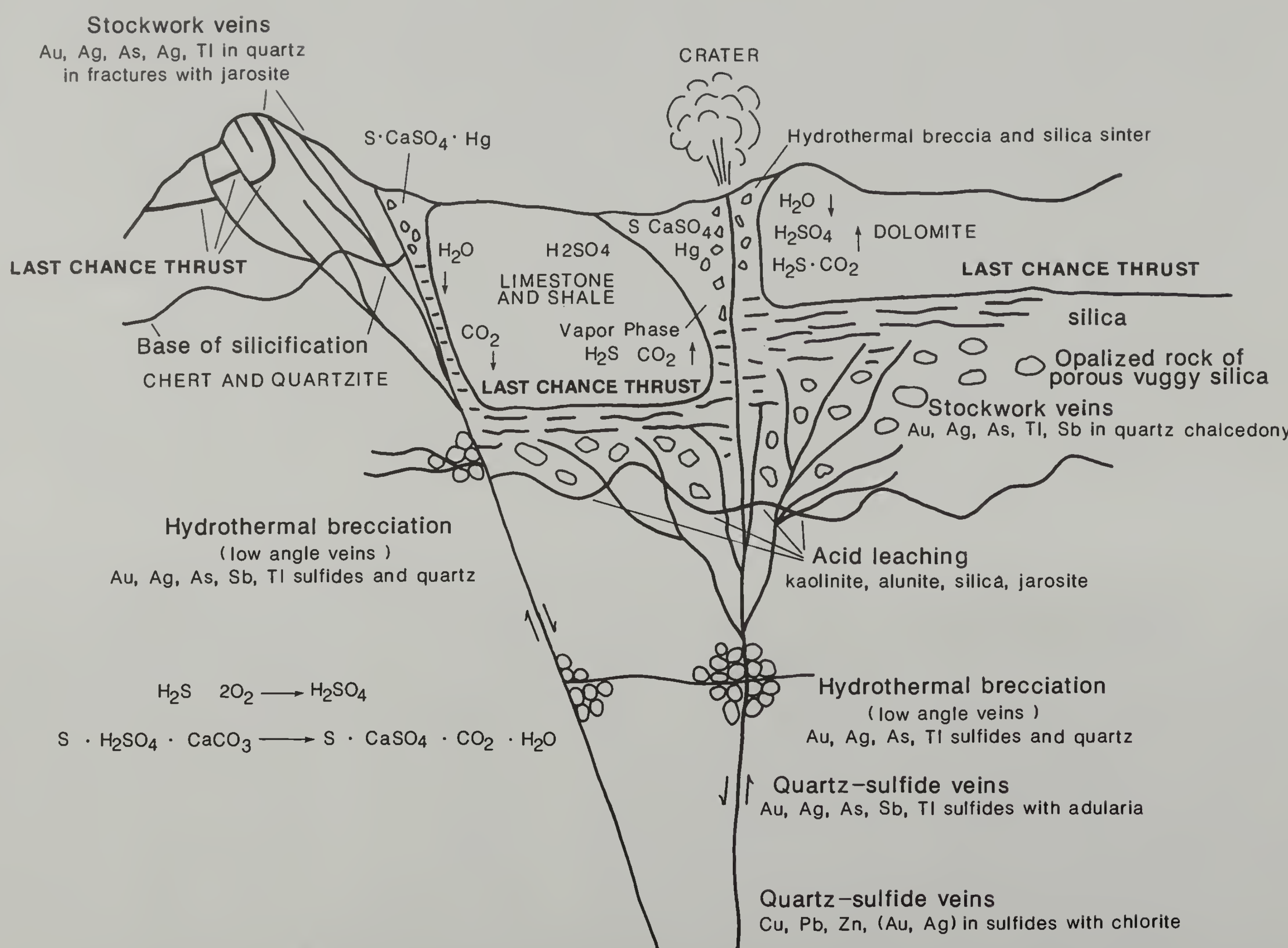

Figure 14. Depositional model for Crater hydrothermal system (from Marsh, 1986).

vania mine, Cucomungo deposit and the McBoyle posit, all located within close proximity to the Califor- -Nevada border. Beginning in 1960 exploration for phyry-type molybdenum became active in the district l was centered around the old Sorenson property icomungo Prospect) at the head of Alum Canyon. A cession of major companies (Duval Corporation, Amoco Denver, Colorado) examined this area up through the 70's (Smith and others, 1983). In 1977 the area from the Boyle deposit to south of the Ace Hills, known as the teline deposit and straddling the California-Nevada der, was claimed and drilled (Schilling, 1977) by Mara- n Oil Company of Denver, Colorado, for a suspected lybdenum porphyry deposit.

The geology of the Sylvania district is dominated by granite rocks of the Sylvania pluton. This large com- ite intrusive body underlies the Sylvania Mountains l extends southeast to the Last Chance Range as well northeast to the Palmetto Mountains. Essentially all of mineral deposits of the Sylvania district, metallic and -metallic, are associated with skarn zones which med along the margins of the Sylvania stock or skarns ich formed in small pendants of sedimentary rock con- ned within the stock (Smith and others, 1983).

The description of the Cucomungo deposit by Albers l Stewart (1972) is presented here because it is the only blished description of any of the deposits in the area, de from Schilling's (1979) summary. "The Cucomungo posit is by far the largest in the county and probably ers the best potential for future development. It lies ng a northwest-trending altered zone in quartz monzo- e of the Sylvania pluton. The altered zone was traced several miles along strike and is as much as 1,000 feet le. In the immediate area of the deposit a block of man Formation (Papke, 1975) is enclosed in the quartz nzonite. The rocks in the altered zone are silicified, icitized, and argillitized. Molybdenite occurs as flakes l rosettes disseminated in the quartz monzonite and as kes along the edges of quartz veinlets. Pyrite is present copper minerals are virtually absent. According to illing (1962, p. 18), ferrimolybdite (?) is present but ficult to distinguish from other secondary minerals. undant dark-blue ilsemannite (?) (a hydrous molybde- n oxide) is forming at the dump of an adit at the lower l of the property and also occurs along a fault zone in altered area."

Additionally, the Ace Hills, contained within the rathon Oil Stateline deposit claim block, were mapped Herron (1980) for a graduate thesis and this work is nmarized below.

Metamorphosed Precambrian or lower Paleozoic car- nate and clastic rocks occur as isolated blocks within dium-grained Jurassic quartz monzonite. During Ter- ry time the rocks were cut by major, intersecting north- st and northeast trending faults. These faults localized periods of upper Oligocene or lower Miocene intrusive ivity. During the first period, five dike-forming rocks nging from quartz latite to diorite were implaced. Weak oritic-sericitic alteration is associated with placement of these rocks. During the second stage, dacite porphyry and quartz latite porphyry were injected into a series of ring fractures. These two units display uniform, pervasive alteration ranging from clay-sericite to strong potassic. In the dacite porphyry abundant vugs on weathered surfaces resulted from leaching of sulfides and altered plagioclase phenocrysts. Pyrite molds and limonite are common, fresh pyrite is sometimes found in silicified rock. Ore mineralization was not discussed in the work by Herron (1980), but it is presumed that disseminated molybdenite and chalcopyrite occur in the Tertiary dacite porphyry and quartz latite porphyry. Several drill holes were sunk in highly altered porphyritic rocks in this area were found to be stained bright red with transported hematite, and mineralized with disseminated molybdenite.

During the period 1969 to 1978,15 diamond drill holes that produced about 17,000 feet of core were drilled by Amoco-Marathon on the Stateline deposit, with 12 holes being sited in the immediate area of the Ace Hills, and 3 being sited within the headwaters of Copper Canyon (Thon Gin, USX personnel communication, 1987). The Bureau of Land Management, in their Final Environmental Impact Statement and Proposed plan for the CDCA, volume G., pg. 79, cite, on the basis of proprietary data, a resource figure of 1,600,000,000 pounds of molybdenum for the Stateline deposit. Marathon Resources dropped their option on the property in 1982.

Loretto Mine Area, MRZ-2b [(h-6)]: This area encircles the Loretto mine property and contains a series of parallel quartz and calcite veins occurring in altered quartz monzonite that contain secondary copper minerals, with minor pyrite, specular hematite and chalcopyrite.

The property was originally developed in the late 1800's by several shallow adits. In 1907 the Loretto was taken over by Schwab and Associates "who after sinking a shaft to the depth of 865 feet, and exploring the property thoroughly to a depth of 1,500 feet with diamond drills disclosing bodies of ore averaging 4 to 5 percent copper and $3.00 per ton gold, decided to immediately start development work on the mine in conjunction with the construction of a modern smelter at a cost of $2,000,000" (Los Angeles Mining Review, August 31,1912). Between 1907 and 1915, the shaft was deepened to 1,800 feet in the hope of intersecting the sulfide zone. A large body of low-grade, oxidized copper ore was disclosed, but it was found that the vein apparently did not continue with depth. Operations on the property were discontinued in 1915 with no production being recorded. (Waring and Huguenin, 1917). The property was patented in 1922 and remained inactive until the mid-1970's when an attempt was made by the Bristlecone Copper Company to open-pit mine the oxidized ore-body located to the southeast of the shaft. The company constructed a small mill with an oxide circuit north of the Eureka Valley Road and milled a small tonnage of oxide ore before closing down in 1976-77.

General trend of the quartz veins is N 75°-90° E, with vertical dips and lengths measurable in hundreds of feet. Mineralization within the area of the open pit reveals secondary copper minerals, principally malachite with minor azurite and chrysocolla, coating fracture surfaces and that this zone of oxide mineralization rapidly dies out along trend to the northwest. The oxide ore grade appears highly variable, but probably averages 1 to 2 percent copper.

Areas Classified as MRZ-3a

Last Chance Range Area, MRZ-3a [h-1] : The Last Chance Range, in an elipitical-shaped area southward from the El Capitan mine, contains numerous prospects that developed widely-scattered mercury occurrences. As noted at the El Capitan mine, veins containing cinnabar, native sulfur, quartz, and gypsum occur outside of the main high-grade, near-surface ore bodies, and various combinations of these same minerals are found at many of the mercury occurrences within the Last Chance Range. Alunite is often present within the bedrock adjacent to the mercury occurrences which commonly are bleached and silicified. Dolomite, where present, is leached and replaced by gypsum. At the Aloha, Eureka, and Rebecca prospects, cinnabar fills fissures, and to a lesser extent shear zones, within highly-fractured quartzite. Cinnabar and metacinnabar are present in fault zones and shears within siltstones and quartzite at the Up and Down, Mercury Knob, and April Fool prospects. USBM sampling revealed erratic assay values with some shear and fault zones showing concentrations of mercury as high as 47.6 pounds of mercury per ton, but with overall concentrations that ranged from 0.002 to 2.0 pounds of mercury per ton. Additionally, most samples revealed the presence of gold with values ranging from 0.002 to 0.26 ounce gold per ton (Wrucke, 1984).

Mercury was also found northeast of Upper Warm Spring along the east side of the Saline Range at the Coffee Stop prospect. At this locality, cinnabar occurs as very thin coatings on cobbles and as fine fragments between clasts in the top 2 feet of alluvium on the valley floor and interstitially in felsic lapilli tuff beds. Deposition apparently resulted from near surface cooling of mineralizing fluids (McHugh, 1984).

The mercury occurrences, sulfur deposits, and the area revealing anomalous gold values are all considered to be genetically related to a hot spring-type hydrothermal system. Based on the near-surface breccia pipes and conduits revealed at the El Capitan mine (Hill, 1972), the mercury veins and fillings in the Last Chance Range probably also originated in a hot springs environment, with the shear zones and faults acting as channel ways for hydrothermal fluids.

The age of the mercury mineralization is probably late Pliocene or younger, as many of the mercury occurrences and the El Capitan deposit are localized along faults that are part of a fault system which has offset volcanic rocks as young as about 4 m.y. old (Elliott and others, 1984). Intrusive latite a few miles east of the Crater mine may be about this age, because latite flows nearby are interlayered with Pliocene basalt. Intrusive silicic volcanic rock found in a shaft at the Crater mine (Lynton, 1938) and the volcanic material in the diatreme to the northeast have not been dated but are assumed to be Pliocene or younger. Two small stocks of light-colored biotite aplite to coarse-grained quart monzonite dated at 7.3 to 7.9 m.y. (McKee, 1985) crops out on the range front east and west of Last Chance Peak, and a biotite-pyroxene diorite pluton dated at 7.5 to 6.3 m.y. crops out at Last Chance Peak (McKee, 1985). Any of these intrusiv rocks at or near the Crater mine could have been the source of heat and possibly hydrothermal fluids for the hot spring system that deposited the mercury (Wrucke, 1985).

Leah-Vanessa and Jenny B. Prospect Area, MRZ-3a [h-2] : This area, lying immediately west of the Death Valley National Monument boundary about 9 miles due north of Dry Mountain, contains two prospects develope on quartz veins within fault breccia zones associated with the Last Chance thrust. These two prospects probably comprised the workings for the Death Valley Gold Mining Company (Green, 1981) that became active in January 1927 within the newly-formed Skookum Minin District. According to the Mining Journal, 15 February 1927, page 31, "development work consisted of 2,000 fe of trenching and the driving of a tunnel and various sh low exploratory holes. Assays were now yielding $34 to $276 per ton". Another Mining Journal entry, 15 July 1927, page 30, noted "A subsidiary tunnel higher on the same mountain was started to intersect an ore shoot from which surface assays had yielded $20 to $500 a to in gold." The Leah-Vanessa prospect contains two shallow inclines and several pits along a 3- to 4-foot thick mineralized bedding plane fault between shale and lim stone. Four USBM chip samples revealed an average of 0.099 ounces of gold per ton, with select samples across the fault zone as high as 0.312 and 0.624 ounces of gold per ton. The Jenny B prospect contains four adits, one inclined shaft and several pits and trenches along the sheared, brecciated contact between limestone and quartzite. USBM samples along the contact zone averaged .132 ounces of gold per ton, 0.14 ounces of silver p ton and 4.29 percent copper, with selected samples as high as 0.488 ounces of gold per ton. The prospects are within an area that showed hematitic anomalies on Landsat imagery, and anomalous geochemical concentr tions of boron, copper, lead, manganese, niobium, and silver indicative of possible mesothermal mineralizatio (Wrucke and others, 1984).

Sugarloaf Mountain Area, MRZ-3a [h-3]: This area i located between Sugarloaf Mountain and Gilbert Pass o Highway 168 and contains several mines and prospects that have been developed within or adjacent to a northwesterly trending septum of calcareous metasedimentar rocks. The southernmost workings consist of three partl caved adits that developed a brecciated quartz vein adjacent to an igneous contact trending N40°W that shows minor copper staining along fracture surfaces and development of minor pyrite boxworks. The metasedimentary zone continues northwesterly for approximately 7,000 fe with numerous shafts, cuts and adits developed along this zone. The majority of workings appear to have developed quartz veins contained within or closely associated wit the margins of the metasedimentary septa. Secondary coppe staining appears to be ubiquitous to all dump material with minor galena and pyrite present. In all probability, these workings are some of the Piper Peak Mines mentioned by Buchard (1881,1882,1883) as containing high-grade silver and/or gold ores with a high percentage of lead. Actual prod

on figures are nonexistent for these properties, with descrip-
ons, names, and locations being unclear within the litera-
re.

West Deep Springs Valley and Indian Garden Creek Area, RZ-3a (h-4): This area consists of numerous, small lead-silver ad gold prospects along with four to five mines that have tensive workings. South of Cottonwood Canyon, all of the ospects and mines are located on quartz veins in Beer Creek uartz Monzonite. All of the mines contain silver, small nounts of gold along with minor amounts of copper in 6-inch 5-foot thick quartz veins. These vein systems generally rike north, average 2- to 4-feet thick, dip 45-85°, and fill ults and shears in the quartz monzonite. This area has been ospected since the 1860's (Burchard 1881, Goodyear, 1888), t extensive mining did not occur until the discovery of the ncoln mine in early 1920.

The Lincoln (Silver Dome, Fringe Benefit #1) mine, which on one of richest and most persistent quartz veins in the ea, is reported to have carried 100 ounces of silver per ton ucker, 1926). With the discovery of the Lincoln mine, the st side of Deep Springs Valley was extensively prospected.

North of Cottonwood Canyon the character of the miner- zation changes and pyrite and gold dominate over galena d silver. The prospects consist of northwest to west-trend- g 2- to 5-feet thick steeply dipping shear zones that contain n quartz veins with pyrite and hematite. The Buck mine s extensive workings and is reported to carry free gold ampson and Tucker, 1940).

Whippoorwill-Jackass Flats Area, MRZ-3a (h-5): Numer- s, small lead-zinc-silver prospects are found in this area. e area is underlain by carbonate rocks, sandstone and artzite that are cut by numerous quartz veins containing gentiferous galena. All of the prospects contained sulfide- aring quartz veins in sedimentary rocks. These vein sys- ns generally strike north-northeast, are discontinuous, erage 1- to 2-feet thick, and are traceable from 500 to 3,600 t along strike. The sulfide minerals occur as pods of galena d are associated with sparse sphalerite, chalcopyrite and condary copper, lead, and zinc minerals (Wrucke and others, 84). Sulfide mineralization appears to be wholly confined thin the system of quartz veins, which typically show no idence of wallrock alteration, and occurs as spotty pods and asses along strike. Thus, most of the prospects have been veloped by numerous small workings along strike.

According to USBM records, the Morning Star property ne had any recorded production and this was only 17 tons ich averaged 13.5 percent lead and 4-5 ounces of silver per n, although USBM calculated 8,200 tons of an inferred re- urce averaging 0.04 ounces of gold per ton, 5.9 ounces of ver per ton, 0.63 percent lead and 0.024 percent copper for e Ruby Port prospect.

The origin of these minerals is uncertain. Many mines st, west, and south of the Saline Valley Wilderness Study ea produced lead and silver, the most prominent being e Cerro Gordo mine in the Inyo Mountains, 0.5 mile rthwest of Cerro Gordo Peak. Three prominent rock pes are common to all of the mine areas: (1) the Hunter ountain Quartz Monzonite, (2) Precambrian-Paleozoic rbonate rocks, and (3) carboniferous shale. The juxtapo- ion of these three rock types helps outline favorable ground and is believed to be an important characteristic of a tentative model proposed here for the lead, silver, and zinc occurrences. Although the main phase of the Hunter Mountain pluton appears to be relatively poor as a metal source, it may have provided sufficient heat to mobilize and transport metallic elements from carboniferous black shale and redeposit them as sulfides in quartz veins in the carbonate host rock. Fluids from the quartz monzonite also could have played a part in the transport of metals. In most areas the veins are small and weakly mineralized. The larger mineralized bodies occur in areas having large amounts of carboniferous black shale as at Cerro Gordo. Further studies are needed to establish the validity of this model.

The closest large intrusive to the Whippoorwill-Jack- ass Flats area is the quartz monzonite of Joshua Flat about 3 miles north. The sedimentary rocks in the area consist of Precambrian and early Paleozoic limestones, siltstones, and quartzite that were thrust over Mississip- pian rocks along the Last Chance thrust prior to emplace- ment of the Joshua Flat pluton. Metals in the underlying Mississippian black shales may have been mobilized by the intrusive event, transported into the overlying Pre- cambrian and Paleozoic sediments, and deposited in sul- fide-bearing quartz veins. The absence of widespread hydrothermal alteration in the area and the absence of Tertiary volcanism (with the exception of the basaltic cover) seems to preclude a more recent hydrothermal ori- gin (Wrucke and others, 1984).

Last Chance Spring Area, MRZ-3a (h-6): Several small prospects are located in the immediate vicinity of Last Chance Spring. A short adit, shallow shaft and an incline developed a northeast-trending shear zone that contains stringers of quartz. The quartz is highly brec- ciated and manganese coated but appears to contain only minor sulfides with some secondary copper stain- ing present. A composite sample from the incline and shaft assayed 0.47 ounces of silver per ton and 0.001 ounces of gold per ton. Immediately west from the above prospects, a series of caved adits and pits developed a northwest-trending, iron-stained contact zone between a massive crystalline limestone and quartz monzonite. The contact is sheared and shows evidence of argillization and minor silicification. Two additional prospects, the first about one mile north of Last Chance Spring, developed a N70°E-striking quartz vein within limestone units that contain pyrite, chalcopyrite and chalcocite associated with well-developed boxworks. A composite sample from the adit and shaft assayed 8.1 ounces per ton of silver and 1.62 percent copper. The second prospect, located about two miles northeast of Last Chance Spring, consists of a daylighted stope and short adit on a N10-20°E striking quartz vein that con- tains blebs and veinlets of argentiferous galena. Selected dump samples assayed 6 ounces of silver per ton, 0.25 ounces of gold per ton, and 1.7 percent lead. No records of production exists for these prospects; however, the size of the workings indicate minor, if any, production.

Willow Spring Area, MRZ-3a (h-7) This area con- tains several caved adits and shallow pits that devel- oped iron oxide-stained shears or felsic dikes present in a quartz monzonite country rock. The shears trend N30°W to N50°E and have widths measurable in inches, and iron oxide staining appears to be attributable to minor pyrite contained within the shear zones or in quartz veins associated with the shear zones. Aside from the minor pyrite, no other sulfides were noted in any of workings or in any of the associated dump material. A composite sample showed 0.42 ounces of silver per ton, 0.15 ounces of gold per ton and 0.38 percent lead. The age of these prospects is unknown; in all probability, some predate the 1900's and remnants of a small mill exists at Willow Spring. Actual production, if any, was probably minor.

Lower Alum Creek Area, MRZ-3a (h-8): Two prospects in a small area of Tertiary volcanics that lies astride the California-Nevada stateline are in this area. The southernmost prospect is developed by a series of bulldozer cuts and small pits in a siliceous, iron-stained volcanic tuff. Although iron oxide coating is very prevalent, the only sulfides present appeared to be finely-disseminated, small pyrite crystals within the tuff. The northerly prospect consists of a cut, shaft, adit and numerous shall pits along a massive quartz vein, 4 to 7 feet wide, that trends N80-90°E and occurs within a highly brecciated, resilicified volcanic tuff. The large size of the vein quartz crystals (6-10 inches in length) associated with iron oxides, the well-developed crystal faces that include pyramidal terminations and abundant open cavities that are lined with drusy quartz in conjunction with the development of a siliceous gossan within the volcanic tuff, are indicative of an epithermal ore-deposit system.

Historically, these Tertiary volcanics have been extensively prospected with a resurgence of activity in the last ten years, as evidenced by numerous claim markers and construction of drill pads. Within Nevada, contemporary Tertiary volcanics are the host rock for several active gold mines near Gold Point. Geologic evidence indicates that the area overlain by Tertiary volcanics should be considered as a favorable environment for epithermal deposits; unfortunately, the areal distribution of Tertiary volcanic units within California are very limited at this locale.

Nelson Range Area, MRZ-3a (h-9): This area lies along the northeastern side of Lee Flat underlain by Paleozoic sedimentary rocks. Several mines and prospects have been developed on copper and lead-bearing quartz veins that are closely associated with the contact between Paleozoic carbonate sediments and the quartz monzonite of Hunter Mountain.

The Copper Queen-Lucky Boy mine has developed a quartz vein which strikes N 25° E, is several feet thick, and occurs within quartz monzonite adjacent to the intrusive contact. The conspicuous copper minerals in the quartz vein at the mine are malachite, chalcopyrite, bornite and copper silicates.

More extensive showings of supergene copper minerals at the Anton and Pobst mine occur along the contact with quartz monzonite and Bird Spring Limestone. The mine was reported to have produced 400 tons of ore, containing 82,000 pounds of copper in 1916 (McAllister, 1955).

Lying between the two copper properties mentioned is the Cerrusite mine. Developed by three adits, this lead deposit occurs in quartz veins in sheared, sericitized granitic rock near the contact with hornfels and marble. Ore mineralization consists of coarse-grained galena, which contains some silver, in a gangue of quartz, with minor chalcopyrite.

Copper Canyon Area, MRZ-3a (h-10): Contains an adit that developed a N 14° W-trending, iron oxide stained shear zone in quartz monzonite and a series of shallow bulldozer trenches that appear to have explored possible skarn mineralization associated with a series of small septa of metamorphic rock that trend northwest. The adit workings, which probably predate the 1900's, reveal minor sulfides (pyrite) associated with small, discontinuous, and highly-fractured quartz veinlets. Isolated fracture coatings of chrysocolla were noted. Four selected samples across shear zone and quartz veinlets averaged 0.11 ounces of silver per ton and 0.007 ounces of gold per ton.

In addition to the above mentioned adit, a series of shallow bulldozer trenches have been cut, apparently in an attempt to intersect possible skarn mineralization associated with small septa of metamorphic rock. The property has been drilled as several drill-hole collars with stuck drill rods are in evidence along the floor of the canyon. The drilling was probably by Amoco during the period 1969-1978 as part of their porphyry molybdenum project (see MRZ-2b(h-5)) or possibly earlier in the 1940's and 1950's as a tungsten prospect when the tungsten price subsidy was in effect.

Soldier Canyon Area, MRZ-3a (h-11): Three small prospects that developed mineralized quartz veins which transect quartz monzonite occur within and adjacent to Soldier Canyon along the northwestern side of Eureka Valley. The southernmost, the Lipp prospect, contains workings that consist of two partly caved inclines, three shallow adits, and a series of shallow pits that have developed a N 20-40° E-striking, 2- to 3-foot wide quartz vein in quartz monzonite. The quartz is highly brecciated, shows massive hematite matrix, minor blebs and veinlets of argentiferous galena and fracture coatings of secondary copper. Grab samples from dumps ran as high as 7.5 ounces of silver per ton and 2.1 ounces of gold per ton. This prospect was undoubtedly developed in the 1800's, and from the size of the workings and the assays attained from dump samples probably recorded some high-grade production during that period. Actual production records are nonexistent for the property.

The middle prospect, consisting of a small open cut along a 100-foot long zone that contains numerous subparallel, 1- to 12-inch wide quartz veins, shows little evidence of mineralization except for minor secondary copper staining, hematite and isolated pyrite.

The northernmost prospect has been developed by a shallow 50-foot deep incline with minor crosscuts and several hundred feet of bulldozer cuts and trenches along a

3-foot wide brecciated quartz vein that strikes due west. e vein material is quartz honeycombed with veinlets of natite and coated with secondary copper minerals, ncipally azurite and malachite. Vein and stockpiled terial is highly oxidized, with only minor blebs of pri- ry sulfides visible within oxide cores. The property may ve realized minor production, but no records could be nd to indicate this.

Juanita Prospect Area, MRZ-3a (h-12): The Paleozoic ks of the Juanita Prospect area have some features gestive of a disseminated gold deposit. An important racteristic of this type of deposit is the geochemical te of mercury, arsenic, and antimony. These elements, some cases including thallium and other metals, are sent in anomalous amounts in and around the ore zone disseminated gold deposits (Erickson and others, 1966; ite, 1981; Siberman and Berger, 1985). High concentra- ns of silver and base metals may be present in these osits, and in the Juanita area anomalous amounts of er, manganese, and zinc have been found (Wrucke, 34; Watson, 1984). Disseminated gold deposits are own to occur in fractured carbonate rocks. The gold is erally disseminated as particles a few microns in size l commonly in association with pyrite and carbon. The rlin deposit, developed in fractured, thin-bedded Silu- n and Devonian carbonate rocks in north-central Ne- la, is the best known example of this type of deposit dtke and others, 1980). The intensely fractured, brecci- d, bleached, and faulted limestone and dolomite in the nita area are favorable host rocks. Jasperoid and silici- l rocks, also common in disseminated gold deposits, are abundant in the Juanita area, although thin films of peroid on fracture surfaces are present. Detailed chan- sampling across jasperoid zones by Intermountain sources revealed gold, arsenic, and mercury anomalies, h selected zones showing gold values ranging from 50 .,800 ppb (Watson, 1984).

Upper Warm Spring Area, MRZ-3a (h-13): The area ween Upper Warm Spring and the Saline Range con- ns mineral springs and is underlain by crumbly, porous osits of travertine and manganese oxides. Known as Black Diamond prospect, four USBM samples across ded manganese oxides and calcite contained between 0 and 1.80 percent manganese, and 0.05 to 0.09 percent gsten trioxide (WO_3); one chip sample across tufa with olusite had 2.4 ounces silver per ton (Wrucke, 1984). rman and Steward (1951) reported 20-30 percent man- ese and 0.24-0.63 percent WO_3 in samples from the spect.

Rainbow - Celjemp Prospect Area, MRZ-3a (h-14): This a contains three small prospects developed upon minor ide mineralization associated with quartz veins in quartz nzonite and along the contact between quartz monzonite l a small septum of limestone. Both the Mejec and Celjemp spects developed 4- to 7-inch wide quartz veins that appear arry minor disseminated pyrite, while at the Rainbow a foot deep shaft has been sunk on a recrystallized quartz n developed within a minor skarn assemblage showing nor secondary copper mineralization along fracture sur- es. All of these prospects probably predate the 1900's, and sibly supported minor production.

AJA Tungsten Prospect Area , MRZ-3a (h-15): Two shafts 5 feet and 8 feet deep and numerous exploration pits in partially altered quartz monzonite are found in this area. One shaft explores a 2- to 3-inch quartz vein that strikes north-south and the other shaft explores a 2- to 6-inch fluorite vein that strikes N46°E and dips 80°NW. The host rock adjacent to the veins contains minor silification and pyritization along with sericite, clay, and trace amounts of chalcopyrite. There is some alteration of feldspar to clay over a wide area in the quartz monzonite, but the amount of tungsten found is unknown. The mineralogy and alteration of the quartz monzonite raise the possibility that this prospect could be developed upon the stockwork of a concealed porphry molybdenum system.

Sylvia Mine Area, MRZ-3a (h-16): The Sylvia mine consists of five adits in mineralized shear zones in the granitic rock. These zones each average about 3 feet in thickness, strike north, and dip at various angles to the east and west. Vein minerals are quartz, galena, anglesite (and other secondary lead minerals), copper carbonate minerals, and native silver. Skarn, composed mostly of brown andradite garnet intergrown with calcite, occurs near the mine in the Wyman Formation at the contact with granitic rock. Surface samples of weathered vein material by USBM were found to contain an average of 2.2 ounces of silver per ton, 0.0005 ounces of gold per ton, 0.11 percent lead, 0.054 percent zinc, and 0.047 percent copper. Stream-sediment samples collected near the mine were found to have anomalous concentrations of silver, lead, molybdenum, and tungsten (Wrucke, 1984).

Altered parts of the granitic body east and southeast of the Sylvia mine exhibit abundant indications that the host rock is mineralized; however, only a few mine workings and prospects exist there. The mine workings consists of shallow shafts and short adits and may date from the early 1900's, based on the badly weathered and disintegrating character of the timbers for head frames and other structures. Quartz, fluorite, pyrite, copper sulfides, and secondary copper minerals can be found on dumps. Skarn bodies have been prospected at a few old workings close to the southeastern exposures of the pluton. Copper minerals, epidote, tremolite, garnet, and calcite have been identified in the skarn.

Spanish Spring Area, MRZ-3a (h-17): The Spanish Spring area consists of the northern flank of Hunter Mountain that encompasses the old Monarch mine property. A small production of tungsten from huebnerite was reported in 1915 (Waring and Huguenin, 1919), but evidence indicates that this mine probably supported earlier high-grade silver production by Mexicans in the 1860's-1870's. Three arrastas and a crude retort exist at Spanish Spring about 0.9 mile from the mine, and USBM sampling revealed silver mineralization (tetrahedrite) assaying 101 ounces of silver per ton and 0.1 ounces of gold per ton as coming from a selected dump sample. The Monarch mine developed a 2- to 6-inch wide quartz vein that is oriented N20°-60°W and dips 70°NE with six partly or wholly caved shafts with reported crosscuts (Partridge, 1941) over a strike length of 2,500 feet. The quartz vein follows a limonite-stained, caliche-impregnated fractured zone in partly argillized quartz monzonite. The vein minerals seen on the dump include quartz, calcite, limonite, traces of supergene copper minerals, and a black mineral that appears to be tetrahedrite.

Lead Canyon Area, MRZ-3a [h-18]: This area consists of the areas lying along the eastern slope of the Inyo Mountains at the northern end of Saline Valley. These areas contain lead-silver mineralization consisting of black, sooty argentiferous galena and cerussite along with some tetrahedrite, pyrite, chrysocolla and quartz. The mineralization fills faults and fractures in gray to cream-colored Cambrian dolomite. The two southernmost areas, containing the Bunker Hill and Blue Monster mines, are the only areas to have reported production. The Blue Monster operated from 1907 to 1911 and is reported to have produced lead-silver ore that was valued at over $100 per ton (Knopf, 1918). The Bunker Hill, which has the most extensive amount of underground workings, is reported to have shipped in the late 1920's and 1930's, ore that was from 30 to 60 percent lead, 33 ounces of silver of silver per ton, and 0.10 ounce of gold per ton (Tucker and Sampson, 1938).

Mineral Hill and Iron Age Area, MRZ-3a [h-19]: This area, lying by the south end of Deep Springs Valley about 2 miles south of Deep Springs Lake, contains the Mineral Hill group of mines and the Iron Age prospects. The Mineral Hill mines consist of 10 adits with extensive underground workings, which operated in the 1920's. These adits explore a series of northeast-striking and east-dipping veins 12 inches to 4 feet thick containing galena and cerrusite in faulted Reed Dolomite. The mines are reported to have shipped ore that was 30 percent lead and carried 30 ounces of silver per ton (Tucker, 1926).

The Iron Age prospects consists of an adit, an inclined shaft, and several prospect pits, which explore 2 bodies of massive hematite and pyrite. The massive pyrite and hematite, which occurs with quartz and limonite, fills 4 foot to 20 foot thick fault zones in bleached, white to cream colored dolomite.

Areas Classified as MRZ-3b

Dry Mountain Area, MRZ-3b [h-1]: Consists of the areas lying along the western slope of the Last Chance Range immediately to the west and northwest of Dry Mountain. Both areas occur along a north-northeast-trending fault zone that offsets alluvial fan deposits, and both are identified from Landsat imagery as having iron oxides of possible hydrothermal origin. The northernmost area is conspicuously red from iron oxides. The fault zone has silicified and sericitized gouge and numerous steeply-dipping veins parallel to one another that contain calcite and manganese oxide. These veins have anomalous concentrations of arsenic, antimony, and manganese. This mineral and geochemical association is suggestive of epithermal mineralization. The fault zone in the other area has hematite as well as poorly ordered iron oxides. Calcite veins in a system of anastomosing veins in the fault zone are as much as 3 feet wide, and some of them have limonite pseudomorphs after pyrite. Anomalous concentrations of arsenic, antimony, molybdenum, and silver were found in samples from the fault zone. Carbonate bedrock is bleached in an interval several hundred feet wide adjacent to the fault zone (Wrucke and others, 1984).

Southern Dry Mountain Area, MRZ-3b [h-2]: Copper and molybdenum occur in skarn deposits developed in calc-silicate rocks formed from Paleozoic carbonate rock adjacent to the Hunter Mountain pluton near the southern end of the study area and in small skarn bodies enclosed in the Hunter Mountain pluton in nearby parts o the Death Valley National Monument.

Concentrations of metals (as much as 1,500 ppm arsenic, 1,000 ppm copper, 0.8 ppm gold, 200 ppm lead, 1,000 ppm molybdenum, 15 ppm silver, and 500 ppm zinc) in veins containing iron oxides and quartz were found in Burchfiel's (1969) border phase of the Hunter Mountain pluton. Tungsten, boron, and niobium also were found in selected samples (Wrucke, 1984).

Additionally, a broad zone of propylitic alteration containing high lead, silver, and zinc geochemical concentrations in Precambrian and Paleozoic carbonate rocks and shale surrounds the area of copper-molybdenum sericitic alteration. This geochemical and alteratio zonation is suggestive of a porphyry-type model, although the geochemical signature is weak. In panned concentrates, lead values ranged from 20-500 ppm, silve values ranged from not detected to 1.5 ppm and zinc values ranged from not detected to 500 ppm. Anomalous concentrations of lead, silver, or zinc occur in many of the numerous quartz-sericite-epidote veins in the area (Wrucke, 1984).

These veins, the pervasive sericitic alteration between the veins, and a local stockwork of fine-grained quartz veins in the granite are indicative of a hydrothermal system probably related to the cooling of the Hunter Mountain pluton. An USGS audiomageto-telluric survey in the area indicated the alteration extends 0.5 to 1 kilometers in depth. Copper and molybdenum in skarn depos- its adjacent to the pluton provide evidence that mineralization is related to emplacement of the Hunter Mountain quartz monzonite. Abundant pendant rock in the vicinity of the mineralized veins indicates the veins occurred high in the pluton. These observations suggest the possibility that a concealed porphyry copper or porphyry molybdenum system may be present in the area. However, the geochemical signature is weak, and porphy ritic or aplitic rocks suggestive of igneous venting to the surface were not found (Wrucke, 1984).

Based on geochemical data and mineralogy, the vein in the area may have a multiphase history for which no single ore-deposit model applies. High concentrations of boron, niobium, and some tungsten in the veins suggest high temperature phase of mineralization when volatile were released during consolidation of the granite. Arsenic, lead, mercury, silver, and zinc in the veins sugge a lower temperature phase of mineralization. Abundant iron oxide and siliceous gossan were observed; and although no sulfide minerals or pyrite were found in the veins, precursor sulfides are assumed. The observed sericitic alteration may have resulted from mixing of magmatic and meteoric waters as the granite cooled. Tl ge size of the vein quartz crystals (commonly 3 inches more in length) associated with the iron oxides, the ll developed crystal faces including pyramidal termi-tions, the symmetrical distribution of the crystals in-rd from the vein walls, and the abundant open spaces tween crystals are suggestive of deposition under thermal conditions; and the areas of finer-grained artz are indications of possible venting to the surface d boiling. A reasonable interpretation of the origin of veins is that they formed in a regime of declining nperatures, possibly from hypothermal to epithermal ditions (Wrucke, 1984).

Central Last Chance Range Area , MRZ-3b $^{(h-3)}$: ese two areas were identified from Landsat data by USGS as having iron oxides and kaolinite of possible drothermal origin. The northernmost area consists of avel that is composed of abundant clasts of Paleozoic bonate rocks in a matrix rich in iron oxides. Anoma-s concentrations of arsenic and mercury were found in nples from the matrix of the gravel. The other area poses brecciated and locally bleached and iron-stained leozoic carbonate rocks. Narrow quartz-calcite veins d thin films of jasperoid in fractures are anomalous in enic, antimony, mercury, manganese, and zinc rucke, 1984).

Saline Range Area, MRZ-3b $^{(h-4)}$: Contained within Saline Range are two areas where evidence of miner-zed rock was identified from remote sensing imagery having perceptible, but weak, concentrations of iron des. The northernmost area lies in Paleozoic carbon- rock adjacent to the west margin of the volcanic field t is extensively exposed in the Saline Range. The car-nate bedrock is broken by a north-northeast-trending lt zone that contains breccia fragments encased in artz. Anomalous concentration of arsenic found in this fied breccia are the only hints of the geochemical suite nmonly associated with gold mineralization. The thern area has carbonate and clastic Paleozoic rocks t are offset along numerous north and northeasterly nding faults and by the Last Chance thrust, which is posed at a small window in the thrust near the middle the area. Scattered thin quartz-calcite veins and thin ns of jasperoid on fracture planes have anomalous ounts of arsenic, antimony, mercury, manganese, and c (Wrucke and others, 1984).

Marble Canyon Area, MRZ-3b $^{(h-5)}$: This area con-ns faulted Precambrian rocks, including carbonate ks, some of which are orange, possibly from alter-on, and some of which are bleached white. Weak con-trations of iron oxides in the area were detected in note sensing studies. Northerly-trending fault zones ve weak concentration of montmorillonite and iron des. Minor narrow quartz veins were found to have malous amounts of arsenic, antimony, mercury, and c suggestive of the suite of elements associated with thermal gold mineralization (Wrucke and others, 34). The proximity of the area to a Mesozoic pluton her than to areas close to Tertiary igneous activity is ggestive that any mineralization that affected the area y have a different origin than rocks that have poten-l for gold resources farther east in the study area.

Additionally, the area immediately south of the anoma-lous region delineated by the USBM, contains several exposures of the Last Chance thrust which may contain similar mineralization.

Lower Warm Spring Area, MRZ-3b $^{(h-6)}$: The areas around Palm Spring-Lower Warm Spring and a series of springs that occur along the playa margin to the south-east of Lower Warm Spring are underlain, in part, by calcareous sinter deposits. Due to the proximity of the tungsten and manganese-bearing travertine deposits at Upper Warm Spring and the genetic interrelationship between these areas of hydrothermal alteration, addi-tional occurrences of these minerals are deemed possible at the aforementioned sites.

West Side of Eureka Valley, MRZ-3b $^{(h-7)}$: A small area anomalous in uranium and thorium was identified on NURE airborne gamma-ray data along the western edge of Eureka Valley during the course of the BLM Eu-reka Valley Study. Aside from a small quantity of ura-nium (0.017 milligrams per liter), detected in a water sample taken from a well drilled by the USGS in the floor of Eureka Valley (Morgan, 1979), and minor ura-nium minerals that occur at the Lucky Strike prospect coincident with the Last Chance thrust, no other ura-nium mineralization has been observed in the area. The uranium in both areas probably was derived by leaching from igneous sources, latite tuffs in the Saline Range and intrusive latite in the Last Chance Range. Interestingly, the NURE airborne anomaly is associated with faulted sandstones and quartzite of the Cambrian age Campito Formation.

Cucomungo - Sylvania Canyon Area, MRZ-3b $^{(h-8)}$: Consists of the area that extends from Cucomungo Can-yon northward to Sylvania Canyon and encompasses land shown on the geologic map as being underlain wholly by Mesozoic plutonic rock; but, in fact contains small isolated septa of metamorphic carbonate rock that show minor development of skarn mineralization. This area does not contain any known prospects; however, geologic reconnaissance into the area revealed the pres-ence of garnetiferous float in several of the drainages with headwaters in the region and this zone encom-passes an area on trend with metasedimentary units that have supported scheelite production to the north-east and southeast.

Sylvia Mine Area, MRZ-3b $^{(h-9)}$: The Sylvia mine area (MRZ-3A$^{(h-16)}$), located about 0.5 mile east of the study area boundary, contains a variety of metallic mineral de-posits in zones centered on a possible molybdenum stockwork deposit (Schilling, 1979). The Sylvia mine itself is in a lead-silver deposit and seemingly part of a zone enriched in base metals and silver. Copper-tungsten skarn deposits lie nearby. The Sylvia mine and the possible mo-lybdenum stockwork occur in monzonitic rock of the Ju-rassic Sylvania pluton, which is the principal rock exposed in the Sylvia mine area. The copper and tungsten bearing skarn deposits occur in masses of the Wyman Formation that are incorporated into the pluton.

Identification by the USGS (Wrucke, 1984) of a possible molybdenum stockwork deposit of small size located east and southeast of the Sylvia mine was based in part on anomalous concentrations of molybdenum in stream-sediment samples and heavy-mineral concentrates in areas of altered monzonitic rock. Other characteristics associated with stockwork molybdenum deposits also are present and include rocks that are uraniferous and contain fluorine but only minor amounts of copper. The altered granitic rock of the Sylvia mine area consists of two altered zones–an outer propylitic zone and an inner sericitic zone. The propylitic zone typically contains chlorite, epidote, and supergene kaolinite; and sericite is present and locally abundant. The sericite-rich rocks in the propylitic zone also contain fluorite. Other features of the propylitic zone include (1) dolomite that formed by magnesium metasomatism of carbonate inclusions of the Wyman Formation near contacts with granitic rocks, and (2) lead-silver enrichment as typified by silver-lead deposits at the Sylvia mine. The sericitic zone is pervasively sericitized and includes veins of biotite, potassium feldspar, and fluorite, as well as minor veins and irregular patches 1 to 4 inches wide of porphyritic granitic rock containing potassium feldspar phenocrysts in a fine-grained aplitic groundmass. Evidence of local silica flooding is provided by concentrations of quartz stockworks in areas a maximum of a few hundred feet across. In places the stockwork veins have conspicuous fluorite and copper sulfides. Quartz in some stockwork veins has a sugary texture, but in most veins the quartz is medium to coarse-grained. Only sparse quartz veins exist in areas of altered rock outside the stockworks. The granitic host rock in areas of quartz stockworks has narrow veins containing limonite after pyrite and anomalous concentrations of silver, zinc, and mercury, and in places silver, copper, molybdenum, arsenic, and antimony. These are the same elements found in the silver-lead veins.

Southern Saline Range Area, MRZ-3b $^{(h-10)}$: This area is located in the southern part of the Saline Range that comprises an inlier of Paleozoic carbonate and clastic rocks that are offset along numerous north- to northeast-trending faults and by an arcuate-shaped exposure of the Last Chance thrust. Due to anomalous gold mineralization that occurrs in narrow quartz-calcite veins and jasperoid films on fracture planes associated with exposures of the Last Chance thrust elsewhere in the study area, this area has been classified as MRZ-3b $^{(h-10)}$ for disseminated gold deposits, associated with the Last Chance thrust.

AREAS CLASSIFIED FOR CONTACT METASOMATIC MINERALIZATION (SKARN)

Areas Classified as MRZ-3a$^{(S)}$

The Copper Queen Mine Area, MRZ-3a $^{(s-1)}$: This area, located north of Deep Springs Valley, contains numerous open cuts, adits, and shafts in a thin- to thick-bedded, gray to white limestone pendant near its contact with the surrounding quartz monzonite. The adits and shafts explore irregular garnet-epidote skarn and 1 to 5 foot thick quartz veins in skarn, quartz monzonite and limestone. The mineralization consists of malachite, azurite, chryscolla and chalcopyrite along with pyrite and hematite. The mine is also reported to carry tungsten as scheelite and to have had production prior to 1912 and again in 1915 (Tucker, 1926; Erick 1948).

Sylvania Canyon Area, MRZ-3a $^{(s-2)}$: Several northwest-trending, metamorphic roof pendants within the quartz monzonite that comprises the Sylvania Mountain pluton are encompassed by this area. Pendants show development of skarn assemblages along, or adjacent to, intrusive contacts and coarsely-crystalline limestone units. As is typical of skarn type mineralization, gangue minerals consist of massive garnet, with lesser amounts of epidote, calcite, quartz, calc-silicates, and ore minerals consist of disseminated scheelite with minor amounts of secondary copper mineralization, principally chrysocolla occurring along fracture surfaces. This area marks the northernmost exposures of northwest-trending zone of scattered erosional roof pendants that originate almost 15 miles to the southeast in the vicinity of Alum Canyon. The area has been extensively prospected, with numerous bulldozer cuts, pits and shallow adits that explored massive garnet zones. The size of some of the workings are indicative of some production, but the actual amount is unrecorded.

Victor Consolidated - Scheelite Prospect Area, MRZ-3a $^{(s-3)}$: Encompasses an arcuate- shaped septum of metamorphic carbonate rocks almost 8 miles in length, where minor skarn mineralization and marble have developed along the contact between Joshua Flat quartz monzonite and the crystalline limestone of the Paleozoic Bonanza King Formation. The rocks are fractured and sheared along a well-defined zone of variable width that extends from the Victor Consolidated mine along the northern contact of the septum into the area of the Rainbow mine. The marble is bleached light-grey to near-white and contains narrow, elongate zones of garnet-rich skarn and talcose minerals. Several mines along this zone have recorded production for talc, but the only reported production for tungsten is from the Scheelite claim, with 400 pounds of 40 percent scheelite having been produced in 1907 (Waring, 1918).

Big Dodd-Little Dodd Spring Area, MRZ-3a $^{(s-4)}$: Consists of the area lying along or adjacent to the old Ubehebe Trail between Grapevine Canyon and the Lippincott mine area that encompasses a completely faulted septum of metamorphic rock of Paleozoic age. The deposits are mostly in marble and calc-silicate rock which has developed within short distances of contacts with Cretaceous Hunter Mountain quartz monzonite on the west and gabbroic differentiates on the east, but a few of the copper showings are in irregular veins of quartz in mixed metamorphic-igneous rock and in veinlets of tourmaline in lode-like clusters within the quartz monzonite. Historically, this septa of metamorphic rocks has been extensively prospected, and fourteen prospects are delineated on Plate 2B along this trend. About 600 feet of underground workings, evenly divided between the Shirley Ann-Sal and Navajo Chief claims, were found in the area (Causey, 1983); the remaining prospects consist of pits and shallow cuts along discontinuous skarn zones or quartz veins The mineral deposits in the Shirley Ann area were probably controlled by faults, more or less parallel to the beds; and in some cases the deposits were shattered by later movement along faults. The deposits are local and irregular in outline as well as in distribution. Although originally worked for copper, bunches of galena and cerrussite cur in calcite and quartz gangue with covellite and glesite along cleavages and borders. The fractures e typically coated with supergene copper minerals IcAllister, 1955). Other prospects along the skarn ne, either within garnet-bearing zones or closely assoated quartz veins, contain irregularly distributed pper minerals with or without tungsten and molybdeim-bearing minerals. Prospects, while numerous, did t demonstrate good continuity of mineralization as bstantiated by USBM assay data (Causey, 1983).

Continuing northward along this skarn zone, both e Bonanza prospect and the Blue Jay mine contain ncentrations of copper minerals with small amounts molybdenum, gold, silver, uranium, and tungsten. ne Bonanza prospect is developed by an open pit in a rrow septum of Paleozoic carbonate rock in quartz onzonite that consists of marble and calcium-silicate nerals. The skarn zones and a quartz-bearing shear ne in the pit contain malachite, chrysocolla, barite d limonite.

The Blue Jay mine consists of a garnetiferous skarn ne that has developed along an intrusive contact beeen Hunter Mountain quartz monzonite and Paleoic age carbonate rocks. The limestones have been tensively recrystallized and locally converted to ctite and mineralized. "Dragontails" and other disconiuous, disharmonic folds indicate that much of the nestone deformed plastically during metamorphism. ne shales have been metamorphosed to slates, and the dding is generally concordant both with the intrusive ntact and with one direction of jointing within the iton. The mineral deposit is localized within and near e tacite developed at the contact of the limestone with e intrusive. Much of the contact is unmineralized, and ctite is developed for only a few inches to a few feet in ickness. One area, however, displays well developed ctite along a pre-mineralization fracture zone to pths in excess of 100 feet. The surface exposure of is tacite ranges from 50 feet to 300 feet in width and 1500 feet to 1800 feet in length. The principal minerzation of the area is localized in this body and in aces extends a few feet into the pluton beneath the cite. The metallic minerals include magnetite, ecular hematite, and the ore minerals: chalcopyrite, olybdenite, and bornite. Associated secondary miner- zation in the deeply weathered portions of the tacite cludes chalcocite, bornite, covellite, cuprite and rysocolla. Both the chalcopyrite and molybdenite exnd into small argillized areas within the hornblende onozonite. (R Knox, 1971 personal communication).

The mine produced 20 tons of ore in 1915 that elded 4,000 pounds of copper and 1,199 ounces of silr. It was drilled by M.S. and W. Resources, Inc., in 71 with 14 drill holes aggregating 3,800 feet, and the illing suggests a 29 foot thick, 590-foot-long mineraled zone that averages 1.05 percent molybdenum. ecords on file with National Park Service, Death Val- National Monument).

Coyote - Black Rock Prospect Area, MRZ-3a$^{(s-5)}$: nsists of two prospects that have been developed on veral small isolated roof pendants of hornfels and marble preserved as erosional septa within the Joshua Flat quartz monzonite. Skarn zones have developed along or adjacent to the intrusive contact and locally contain chrysocolla, malachite, and sparse chalcopyrite. Six USBM samples averaged 1.6 percent copper, three contained 0.3 to 2.4 ounces of silver per ton and five contained 0.006 to 0.192 ounces of gold per ton (Wrucke, 1984).

Anton and Pobst Mine Area, MRZ-3a$^{(s-6)}$: According to McAllister (1955), the underground workings at the Anton and Pobst mine were in irregularly copper-stained marble and epidotized rock near the contact with quartz monzonite. Subsequent bulldozer cuts to the east of this mine have revealed the existence of several pods of skarn developed along the contact between calcareous metasedimentary rock and quartz monzonite. The pods appear to pinch and swell along this contact zone and in places contain massive garnet, epidote, calcite with no apparent tungsten mineralization. The current owners reportedly attempted to market the massive garnet as an abrasive during the early 1980's, but with little success.

Waucoba Tungsten Mine Area, MRZ-3a$^{(s-7)}$: Consists of the area surrounding the Waucoba Tungsten mine which produced scheelite from small, irregular and discontinuous bodies that occurred as parallel bands in argillite interbedded with limestone and quartzite and in close proximity to an intrusive contact with granodiorite. Actual production figures are not available although the property operated from 1939 to 1942 with mill heads averaging between one and two percent tungsten trioxide (WO_3) (Norman and Stewart, 1951). An adjacent prospect, the Buckwheat, has prospected small discontinuous, garnetiferous lenses and veins that contain isolated, disseminated flecks of scheelite occurring along or adjacent to a limestone-granodiorite contact zone.

Mary V- Indian Prospect Area MRZ-3a$^{(s-8)}$: Northward along Dry Mountain from the Blue Jay mine area (MRZ-3a$^{(s-4)}$), several small isolated occurrences (Mary V prospect, Indian prospect and Lucky Rich prospect) of copper bearing skarn have developed along contacts between Hunter Mountain quartz monzonite and Paleozoic age carbonate rocks. Typically, the skarn zone widths are measurable in tens of feet, with discontinuous lengths of hundreds of feet. All prospects contained copper, with a maximum of 0.12 percent recorded at the Mary V prospect; most contained minor amounts of silver, tungsten and molybdenum. Aside from minor prospect activity, no record of development or production has been located.

Areas Classified as MRZ-3b$^{(S)}$

Dry Mountain Area, MRZ-3b$^{(s-1)}$: Contains several known skarn (MRZ-3a$^{(s-8)}$) occurrences that contain minor amounts of base and precious metal mineralization. USGS geochemical sampling in the Dry Mountain area revealed concentrations of metals (as much as 1,500 ppm arsenic, 1,000 ppm copper, 0.8 ppm gold, 200 ppm lead, 1,000 ppm molybdenum, 15 ppm silver, and 500 ppm zinc) in veins containing iron oxides and quartz within border phase rocks of the Hunter Mountain pluton. Tungsten, boron and niobium also were found (McHugh, 1984) in selected samples and are suggestive of a high-temperature phase of mineralization when volatiles were released during the cooling and consolidation phase of the pluton. These veins, the pervasive sericitic alteration between the veins, and a local stockwork of fine-grained quartz veins in the granite are indicative of a hydrothermal system probably related to the cooling of the Hunter Mountain pluton. Abundant roof pendant rock in the vicinity of the mineralized veins indicate that the veins occur high in the pluton. With all of these indicators in consideration, the data is suggestive of an area that could host a porphyry molybdenum system or skarn deposits developed in carbonate rocks adjacent to plutonic contacts.

AREAS CLASSIFIED FOR PLACER MINERAL DEPOSITS

Areas Classified as MRZ-3a(p)

Marble Canyon Gold Placers, MRZ-3a (p-1) : Gold placers occur along Marble Canyon. Although discovered in the early 1900's, development did not occur until 1934 (Tucker and Sampson, 1938). The channel on which numerous shafts have been sunk is approximately 200 feet in width and extends in an east-west direction for about nine miles. According to Tucker and Sampson (1938), "the gold occurs on bedrock and is fairly coarse in size, ranging from the size of wheat grains to nuggets." Production has been mostly unrecorded, but at least 329 ounces of gold and 22 ounces of silver were recovered from more than 7,000 cubic yards of gravel between 1936 and 1960. Gravel mined during that period averaged $1 to $7 per cubic yard at a gold price of $35 per ounce, although a single nugget had a value of $300. Production came from eighteen shafts with over 3,000 feet of drifting in bedrock gravels (Wrucke and others, 1984). The USBM sampled the Easy Pickings and Krater-Van Norman shafts in 1983 with the following respective results: three samples contained from a trace to 0.000452 ounces of gold per cubic yard (0.009 to 18 cents per cubic yard); one sample from bottom of shaft contained 0.000265 ounces of gold per cubic yard (10.6 cents per cubic yard) and five samples from channel and terrance gravels contained 0.00000103 to 0.000638 ounces of gold per cubic yard (0.04 to 25.5 cents per cubic yard) (gold price at $425 ounce). Samples from underground workings, older alluvium, and present stream channels indicate that gold occurs in older gravels that form parts of the canyon walls and cap nearby ridges as well as in the bottom of the canyon. The source of the placer gold in the Marble Canyon area of the Inyo Mountains is not known. However, McKee and others (1983) have speculated that the inverted gravel depths, size distribution of the gold, and a gold-barren headwater drainage of Marble Canyon suggest that the gravels were derived from a pre-Tertiary stream system with headwaters in the White Mountains. Gold-bearing erosional remnants of pre-Tertiary stream sediments found as far as 30 miles north in the vicinity of Crooked Creek in the White Mountains support this hypothesis (Diggles and others, 1983).

Beveridge Canyon Gold Placers, MRZ-3a (p-2) : The extensive erosion of the gold-bearing veins in the Inyo Mountains could have resulted in gold placers in the bottoms of the cross cutting canyons. However, the only placer claims known along the eastern escarpment of the Inyo Mountains are on the small alluvium deposits (320,000 cubic yards) in upper Beveridge Canyon. There is no record of placer gold production from these deposits or from the smaller alluvium deposits along the adjacent canyons. Alluvium samples by the USBM from Beveridge Canyon contained minor amounts of gold; of the ten samples containing gold, the best four had 0.07 to $0.19 per cubic yard of gold (at a gold price of $425 per ounce). None of the alluvium samples from the other canyons contained gold (Close, 1985).

Oriental Wash-Tule Canyon Placer Deposit, MRZ-3a (p-3): Quaternary alluvial gravels cover almost all of the area lying west of the California-Nevada stateline in the northern Death Valley area. Material in the alluvial fans adjacent to the border east of Little Sand Spring came from sources that drain into Oriental Wash and Tule Canyon, which are alluvial channels that extend into California from headwaters in Nevada. Several areas of lode gold occur in Nevada within the area that is drained by Oriental Wash and Tule Canyon (Albers and Stewart, 1972). Samples collected by the USBM to determine if placer gold exists in the alluvial fan deposits of Oriental Wash and Tule Canyon were found to contain low concentrations of gold. Of 40 bulk panned concentrate samples, 12 scattered throughout this area were found to contain detectable gold averaging 6.4 cents per cubic yard (gold valued at $400 per troy ounce) with a maximum amount of 66 cents per cubic yard (Wrucke and others, 1984).

Areas Classified as MRZ-3b

Northern Eureka Valley Placer, MRZ-3b (p-1) : The northern part of Eureka Valley is the site of several exposures of Tertiary conglomerate units which may be equivalent to Tertiary auriferous gravels found along Crooked Creek in the White Mountains to the north and along Marble Canyon to the south. The largest exposure, an alluvial fan deposit lying 2 miles south of Sugarloaf Mountain, reveals a poorly-sorted conglomerate with the clasts composed of well-rounded metamorphic rocks, principally quartzites and phyllites, with minor schist. This alluvial fan has been the site of recent prospecting activity (Eureka Silver claims) as numerous shallow bulldozer cuts and backhoe trenches commensurate with a placer sampling program exist on the fan. An additional exposure of residual Tertiary conglomerate facies exists immediately east of Deep Springs College along the crest of hills separating Deep Springs Valley from Eureka Valley. Conglomerate at this location is a very thin veneer of metamorphic clasts lying immediately upon granitic bedrock. Due to regional uplift, eastward tilting of the mountain range, and erosion, the incised eastward-flowing drainages into this Tertiary headland has been classified as speculative for placer gold resources.

AREAS CLASSIFIED FOR INDUSTRIAL MINERAL DEPOSITS

Mineral land classification of the Eureka-Saline ley Area, with respect to industrial minerals, is pre- ted on Plates 3A and 3B in composite form for car- ate rock, talc, sulphur, pozzolan, wollastonite, net, salts, boron, gypsum, lithium and silica. A Min- l Resource Zone assigned to any one area represents highest order of mineral favorability judged to exist either type industrial mineral deposit. For example, n area is classified MRZ-2 with respect to carbonate k but is MRZ-1 with respect to talc, MRZ-2 is shown. as classified MRZ-2 and MRZ-3 are labeled accord- to commodity type by superscripts.

as Classified as MRZ-2a

Crater Sulfur Mine Area, MRZ-2a (Sulfur-1) :In 1917 fur was discovered on the western slope of the Last ange Range in Inyo County, about 5 miles west of the th end of Death Valley and about 48 miles east of Pine. The mineralized area is about 3 miles in gth by 1 mile in width with a general north-south ke. Several north-trending faults cut Tertiary volca- and sedimentary rocks in the area, and two princi- zones of sulfur mineralization are parallel to, and nded by, these faults (Lynton, 1938). These zones each about 2,500 feet in length and have irregular ths. Most of the sulfur occurs as steeply-dipping ns of various sizes, as shallow, flat-lying bodies, the position of which is probably controlled by fracturing he rhyolite, and disseminated in bodies with indefi- boundaries (Lynton, 1938). Wallrock observed on surface is a dense, white, silicified rhyolite, whereas l holes and underground workings revealed wallrock ypsum, conglomerate, and chert (Lynton, 1938). ttered beds of essentially barren pumice tuff also present. The Crater, Fraction, and Southwest Sul- r claims lie astride both zones of mineralization, ereas the Gulch claims immediately to the south upy a smaller mineralized area that appears sepa- from the other two areas. The sulfur occurrences attributed to the oxidation of hydrogen sulfide gas, ts interaction with sulfur dioxide gas of volcanic in. The hydrogen sulfide gas necessary for the reac- s is thought to have been derived from gypsum by action of organic matter and carbonic acid water. ne sulfur was deposited by solfataric action (Vernon, 1).

Principal development has been on the Crater up of claims near the north end of the mineralized a, the Fraction and Southwest Sulphur group adjoin- the Crater group on the south, and the Gulch group r the southern end of the mineralized area. Although y claims were located in the area, little production of fur was realized until 1929 when Pacific Sulphur npany began mining operations on the Crater ms. This company mined through 1930. In 1931 and 2 other operators worked the claims, and it is re- ted that 30,000 tons of 75-to-80 percent sulfur ore e shipped to Los Angeles by June 1932. In 1934 the stern Sulphur Industries was reported to have shipped 4,500 tons of 96-percent sulfur; and in 1936 and 1937 Sulphur Diggers Inc. installed retorts and was reported to have shipped 5,000 tons of 96 percent sulfur and some refined sulfur. Since 1937 several other leasees have worked the Crater claims and have pro- duced an unknown amount of sulfur. Production data from U.S. Bureau of Mines Yearbooks indicate that pro- duction was recorded for the Crater group of claims from 1958 until 1968. Mining was done by several dif- ferent groups including the Inyo Soil Sulfur Company (1963-1967) and Magma-Minerals, Inc. (1968-1969). In 1969 North American Resources did exploration on the Crater claims. No production is reported since 1969, and USBM reports a total production of 58,000 long tons of crude ore from the Crater mine (Weiler, 1966).

The Fraction and Southwest Sulphur group of claims were worked by the Italio Sulphur Industries, Inc., in the late 1930's. Mineralization occurs in grades ranging from 7-to-85 percent sulfur. Ore recovered from a number of shafts, drifts, and open cuts was trucked to three sulfur ovens that produced sulfur in 175 pound cakes of 99.5 percent purity (Tucker and Sampson, 1938). Production from this operation is unknown, but 50 tons of refined sulfur were on hand when visited by Tucker and Sampson in 1938.

The Gulch group of claims is near the southern end of the mineralized zone. Sulfur occurs in pure, crystal- line form intermixed with a kaolinized material in lime- stone, gypsum, and cherty shales. Three parallel seams of sulfur with a north-south strike and a 40°W dip occur in the limestone. The sulfur seams vary in thickness from 10 to 20 feet. Development consists of short adits, shallow shafts and an open cut. Production from the Gulch group is listed at 3,700 long tons of crude ore (Weiler, 1966). Some sulfur was being mined from an open cut in 1955 for use as an agricultural mineral.

Production records from all claims in the Last Chance Range sulfur deposits are incomplete. Lydon (1957) estimated that the equivalent of more than 50,000 tons of 100 percent sulfur was produced from the area up to 1945. Since 1945, intermittent attempts at mining by different groups have yielded only a few thousand tons of 25 to 40 percent sulfur used as a soil aid. When the area was examined in early 1986, the main pit on the Crater claims had been enlarged to about 200 feet (north-south) by 500 feet (east-west) and approximately 50 to 60 feet deep. Remains of the old plant are found on the site.

Sulfur resources certainly exist at this locality. Lynton (1938) estimated, on the basis of some drill hole data, that 2,500,000 tons of 40 percent sulfur ore existed for the Crater area. McHugh and others (1984) estimated that more than 3 million tons of demonstrated resources averaging 40 percent sulfur remain at the Crater mine.

White Eagle Talc Mine, MRZ-2a (Talc-2) : Currently operated by Okuniewicz Mining Company with steatite- grade talc being produced and marketed to both ceramic tile and cosmetic manufacturers. The property was origi- nally brought into production in 1941 (Page, 1951) and operated intermittently until 1985, when the present operators began continuous operations. Current production is between 2,000 and 4,000 tons annually, and Wrucke (1985) credits a combined production of 50,000 tons of talc for the White Eagle and Grey Eagle (Eleanor) between 1941 and 1979.

The deposit occurs within a faulted section of Paleozoic carbonate rocks in close proximity to an igneous contact zone. The talc body is irregular in both plan and section, with the irregularities being the result of igneous intrusion and hydrothermal alteration. The talc grades into dolomitic marble, granite, and silica rock and was almost certainly formed by hydrothermal alteration of all three (Page, 1951; Wright, 1948).

Production is attained from five draw points that are pulling material from underneath the original bench cut area. According to unpublished reports furnished by the operators, only two diamond core holes were attempted. Both holes were incline holes from the adit level, and both encountered highly fractured ground and had very poor core recovery. No attempt has been made to drill on the down-dip extension of the ore body, although the current operators plan to drive an exploration drift to encircle the talc body which has an unknown thickness at the adit level. Although measured reserve figures are not available for the White Eagle, indicated reserves, based on the vertical continuity of the body between the adit working level and the original bench cut, are substantial.

J. O. Mine Area, MRZ-2a (Wollastonite-3) : Consists of the area on the northern flank of Hunter Mountain where extensive wollastonite mineralization has developed in altered skarn zones along the contact between Paleozoic limestones and Cretaceous Hunter Mountain quartz monzonite. The bulk of the wollastonite rock is held by 47 contiguous lode mining claims known as the J.O. and Calmet Groups, which extend well into the Death Valley National Monument. Outcropping about 1/2 mile west of the monument boundary, the wollastonite-bearing zone can be traced almost continuously for 5 miles in a southeasterly direction to north of Gold Belt Spring. The wollastonite occurs in a north-dipping contact band 300 feet to over 1,000 feet wide as exposed in surface outcrops. The rock can be traced along most of its known distance in a nearly continuous zone broken by small fault off-sets of a few hundred feet. Mineralogy is consistent with the usual assemblage associated with contact metamorphism: garnet, amphiboles, epidote, calcite occurring with and within the wollastonite body. Estimates to assess the available tonnages of wollastonite rock, as inferred from surface exposures and a limited exploratory drilling program, range upwards to as much as 200 million tons. The bulk of this reserve falls within the Death Valley National Monument, with perhaps upwards of 26 million tons available on the west end of the property (Clark, 1980). A confidential report prepared by Moore and Taber (1985) presented an analysis of the J.O. property located in the parcel. Total volume of all categories (measured, indicated and inferred) of reserves was estimated to be 18,000,000 tons (or more) of ore containing an average of 60 percent wollastonite. In 1985, 43 exploration holes were drilled on the J.O. property by Nor Con Industries. The data has not been released to the public (BLM, 1988).

Areas Classified as MRZ-2b

Saline Valley Playa Deposits, MRZ-2b (Na,Bo-1) : The Saline Valley, a closed basin underlain by alluvial and playa sediments, has a perennial brine lake within the topographic low located along the southwestern side of the valley. This salt lake, fed by a fresh water spring, i located within the 12-square mile circular area occupie by the playa, the surface of which is covered with mud and rough broken blocks of dust-coated salt. Immediately surrounding the salt lake, is an area approximati one-square mile that is underlain by smooth, clean salt that is recrystallized by occasional floods of storm wate Discovered in 1864 (Hanks 1882), the salt deposit in Saline Valley was first worked on a small scale in 1903 ar 1904. The property laid dormant from 1905 to 1913 wh construction on a 13.5 mile long aerial tramway to tran port salt from Saline Valley over the Inyo Mountains t the railhead at Swansea was completed by the Saline Valley Salt Company. The Saline Valley tramway had capacity of 20 tons per hour and at the time of operatio had the record for a vertical lift tramway. Cars were loaded at elevation 1,100 feet in Saline Valley and hauled up to the crest of the Inyo's at 8,500 feet, and then to terminus at 3,600 feet in Owens Valley. The tramway operated until 1918 with tens of thousands of tons of salt being produced by the Saline Valley operation (Ver Planck, 1957). In 1920 some salt was produce

After five years of inactivity, the Sierra Salt Company began production in 1926. Trucks were utilized to haul the salt to Keeler over the newly constructed Salii Valley Road until 1929 when the tramway was overhauled and which operated until 1930 when the operation ceased. The last reported mining of the Saline Valley deposit occurred in 1955 when salt was reportab being stockpiled, awaiting the construction of a milling facility at Keeler (Mineral Information Service, vol. 8, r 8,1955, p. 3).

From 1911 to 1930 salt was recovered by scraping u the smooth salt and by solar evaporation both of natural brine and of artificial brine prepared from the smooth sa and fresh water from the spring. The smooth salt is unusually pure and contains no measurable amounts of calcium or magnesium. Analysis showed: NaCl 98.52 perce Na_2SO_4 1.02 percent, K_2SO_4 0.37 percent, insoluble 0.17 percent and moisture 0.12 percent (Gale, 1912). Shallow drill holes are reported to have encountered alternating layers of mud and salines to a depth of 30 feet (Tucker, 1926, p. 527), with a 4 foot thick zone of thenardite (Na_2SO_4) encountered. Thenardite reserves contained within the playa have been estimated a 400,000 to 1,000,000 tons, although the material would have to be cleaned before being marketable (Lombardi, 1964).

According to Gale (1912) other parts of the Saline Valley playa contained a minor amount of borax which was recovered during the period 1895 to 1907. Before 19 the salt crust from certain parts of the playa had been collected and dissolved in tanks of hot water which became supersaturated with borax and, upon cooling the borax crystallized from the solutions. The principal bora producing plant was located about 1 mile north of the sa and another borax works is reported to have been ated southeast from the Lower Hot Springs on the east of the valley.

Deep Springs Valley Playa Deposits, MRZ-2b (Na,K-2): p Springs Valley, a desert basin, has been consid- l as a source of sodium and potassium salts. The ey is an alluvium-filled sunken fault block, whose r is 13 miles long, 4.5 miles wide, and from 1,000 to 0 feet below the mountains that enclose it. In the heastern part is Deep Springs Lake, a shallow body ncentrated brine about a mile in diameter, that is by nearby springs of warm water and by occasional dbursts. Fossiliferous lake beds high on the moun- s show that in relatively late Quaternary time the ey was a fresh water lake 400 to 500 feet deep, the et of which was eastward through Soldier Pass to eka Valley (Ver Planck, 1957, p. 28).

About 1920 the Inyo Chemical Company prospected p Springs Lake for potassium and sodium salts, but results did not encourage further work. The lake er was found to contain 8.42 percent dissolved salts, the salts contained 4.81 percent K_20. Three shallow holes sunk on the northeast shore encountered e containing from 14.2 to 20.0 percent salts, with to 10.75 percent being K_20. The brine is of the so- n chloride-sulfate type with considerable carbonate potassium; sodium chloride, however, amounts to than half of the total dissolved solids (Tucker and pson, 1938, p. 497).

Bonham - Florence - Holiday Talc Mine Area, MRZ- (Talc-3): Consists of an approximate three mile long that encompasses the Bonham, Florence and Holi- talc mines. These mines have developed lenses of that have formed in a flinty, dolomitic limestone at intersections between bedding-plane fractures and t zones. At the Florence mine the lenses attain a kness of 4 to 5 feet with a strike length of 2,200 at the Bonham mine, lenses attain a width of 5 to et and a length of 700 feet. Typically the talc is ky, white to green to black, grades into the wall , contains pods of hard, siliceous-calcareous rock, is a mixture of steatite and non-steatite grade talc.

According to Page (1951) the Bonham (White Moun-) deposit was known to Indians who sold talc to the o Gordo mine in the 1870's for use as a refractory nelting. The deposit was claimed by Roy C. Troeger 914 and was leased and mined in conjunction with Florence talc mine from the 1930's to 1984. Prior to l, 20,000 to 25,000 tons of talc were shipped (Page, l; Norman and Stewart, 1951) from the Bonham about 8,000 tons from the Florence. An additional 00 tons are estimated to have been produced be- en the 1950's and 1984 (Close, 1985).

The USBM has estimated that four delineated lenses e Florence mine contain about 250,000 tons of talc rves, and about 32,000 tons of talc reserves remain in wo lenses at the Bonham talc mine. Additional talc urces would probably be delineated by trenching and ing at both properties (Close, 1985).

Grey Eagle - Dorris Dee - Snowflake Talc Mines, MRZ-2b (Talc-4): This area incorporates three talc properties along the eastern escarpment of the Inyo Mountains that have formed along the contact between quartz monzonite and Paleozoic dolomitic limestones.

The Snowflake mine was discovered in the 1890's and has been worked intermittently since that time. In 1984 Pfizer Incorporated acquired an interest in the property and began development. No production was recorded for the mine; however, it is estimated that 5,000 tons of talc were produced on a custom basis (Close, 1985). Identified at the mine are four irregular, curvilinear, lenses of talc that are as thick as 20 feet and total 2,000 feet in length. The four lenses average about 6 feet thick and are estimated to contain 340,000 tons of non-tremolitic, steatite-grade talc. Additional talc is likely to be disclosed by trenching and drilling (Close, 1985).

The Grey Eagle (Eleanor) was located in the early 1940's (Page, 1951) and has been mined intermittently until 1985. Actual recorded production is unknown; however, 50,000 tons is cited by McHugh (1984) as having been produced jointly from the White Eagle and Grey Eagle between 1941 and 1979. Undoubtedly, the majority of this production came from the White Eagle. The Grey Eagle was operated on a custom basis by Okuniewicz Mining until 1985 when their operations were switched wholly to the White Eagle.

Areas Classified MRZ-3a

Eastern Inyo Mountains Talc Area, MRZ-3a (Talc-1): Consists of the area lying along the precipitous eastern escarpment of the Inyo Mountains that encompasses the Willow Creek, Grey Eagle, White Eagle, Dorris Dee and Snowflake talc mines.

The east slope of the Inyo Range is an eroded fault scarp, steep, devoid of soil, and prone to landsliding, that has developed along the contact zone between Paleozoic age metasedimentary rocks and quartz monzonite. In general, rock units consisting of quartzite, marble, dolomite and granitic material, occur in roughly parallel bands but with much local irregularity. The granitic rock is moderately discordant in its relations with the other rocks, with the dolomitic marble and quartzite occurring as isolated patches as well as continuous bands. These irregularities in the areal pattern of the rocks are principally the result of igneous intrusion and hydrothermal alteration rather than folding, faulting, or other structural deformation. The hydrothermal solutions did not originate from the granitic plutons, nor from the various dikes now exposed near the talc mines. Instead, it is probable that the alteration of rocks along the eastern escarpment of the Inyo Mountains is the result of the upward migration and localization along preexisting faults and contacts of hydrothermal fluids related to the Tertiary age volcanism that affected and is evident in the Saline Valley area.

Nicolaus - Eureka Talc Mine Area, MRZ-3a (Talc-2): Consists of the area underlain by an arcuate shaped septa of Paleozoic carbonate rock in contact with Joshua Flat quartz monozonite that hosts irregular lenses and pods of talc as irregular replacement bodies along a faulted intrusive contact. This zone contains four properties: Victor Consolidated, Harlis and Broady, Nicolaus-Eureka, and Green Rock. The Nicolaus-Eureka produced about 75,000 tons of steatite-grade talc during intermittent operation from 1945 to 1970 for use in cosmetics and pharmaceuticals (Chidester and others, 1964). This deposit contains both high-grade (steatite) talc and high-alumina, chloritic (clinochlore and chloritoid) talc. The Harlis and Broady mine produced 31 tons of talc in 1957 and no production is recorded from the Victor Consolidated mine or from the Green Rock prospect (McHugh, 1984).

All of these deposits formed from the irregular replacement of Paleozoic sedimentary rocks along a quartz monzonite intrusive contact zone. Most of the deposits, specifically the Nicolaus-Eureka, have been mined, both laterally and down-dip, to points where they pinch out, or are too thin, to be mined profitably. Wright (1966) stated that talc deposits, comparable in size to those already mined, probably exist at shallow depths, but discovering them will be difficult and expensive.

Eureka Valley Playa Area, MRZ-3a (Li,U-3): Anomalous concentrations of lithium were detected in cuttings from a hole drilled in the Eureka Valley playa by the U.S. Geological Survey in 1978. The playa occupies approximately 1,000 acres, but playa deposits may underlie much of the valley floor now covered by alluvium and dune sand. The USGS drill hole was drilled to a depth of 340 feet. From depths of 20 to 220 feet samples of mostly clay and mud taken at 5 foot intervals averaged 0.0479 percent lithium; three zones contained from 0.092-0.095 percent lithium. Samples taken from below 220 feet were mainly sand and averaged less than 0.01 percent lithium (Morgan, 1979). In addition, a water sample collected from the lithium exploration drill hole was found to contain 0.047 milligrams uranium per liter (J.A. Crowley, 1979, written communication). Gamma logs from the hole show increased radioactivity below 200 feet and the uranium contained within the water sample may have been derived from sandy layers penetrated during drilling (Wrucke, 1984).

Eureka Valley Sand Dunes, MRZ-3a (Silica-4): The southern part of Eureka Valley is the site of a dune field that has dimensions of 700 feet high, up to 4,000 feet wide and a lateral extent of 3 miles and contains in excess of 300 million tons of eolian sand. The sand consists of approximately equal amounts of quartz and feldspar and has lesser amounts of mica, magnetite, hematite, calcite, amphibole, rutile and lithic fragments. Nine samples analyzed by the USBM averaged 66.6 percent $Si0_2$, 12.9 percent Al_203, 4.0 percent Ca0, 1.1 percent Mg0 and 2.3 percent Fe0. One sample was found to have minor, but anomalous, amounts of lead and silver (McHugh, 1984).

Saline Valley Sand Dunes, MRZ-3a (Silica-5): The northern and southeastern sides of Saline Valley are the sites of dune fields that comprise several square miles of eolian sand. The sand consists of approximately equal amounts of quartz and feldspar and appears to have a higher percentage of dark minerals (magnetite, amphiboles) than the eolian sand dunes in Eureka Valley.

San Lucas Canyon - Nelson Range Area, MRZ- 3a (Wollastonite-6): Wollastonite, which occurs widely in the calc-silicate rock, forms anhedral grains ranging in size from microscopic to several millimeters in length in the wollastonite-diopside-plagioclase rock of San Lucas Canyon. The wollastonite generally is nearly white, but the coarsest, which contains disseminated grains of chalcopyrite, ranges from light brownish gray (5 YR 6/1) to yellowish gray (5 YR 8/1). Wollastonite at the quartz monzonite contact of a 100 foot zone of calc-silicate rock 1.6 miles N36°E of the Cerro Gordo road junction in San Lucas Canyon is closely associated with green-zoned garnet, calcite, epidote, quartz, chalcedony and stilbite. Southwest in the Nelson Range, at a contact about 2,00 feet N 80°E of the end of the road north of the Cerrusite mine, white wollastonite is intergrown with moderately coarse grained grayish-green diopside and forms some coarser grained aggregates of pure wollastonite in marble (McAllister, 1955).

Saline Valley Pozzolan Area, MRZ-3a (pz-7): Consists of an area of Tertiary rhyolitic tuffs that contain zeolites and trace amounts of mercury. Several small exploration pits investigate altered white to tan, flat lying to northwest dipping zeolitic tuffs that are underlain by white to dark-gray, massive Cambrian dolomite and overlain by basaltic flows. These tuffs are exposed along high angle faults in the northeastern portion of the Saline Valley. Although these prospects have not recorded production, the tuff may be suitable for use in the manufacture of pozzolanic cement, concrete, and zeolites.

Northern Saline Valley Quartz Area, MRZ-3a (Si-8): This area consists of numerous shallow prospect pits atop a steep ridge of dark Harkless Formation quartzite at the north end of Saline Valley. The mineralization consists of euhedral quartz crystals up to 1 x 8 inches long that commonly contain fluid, stibnite, or pyrite inclusions. The quartz crystals occur in clay filled fractures or shears in the quartzite. The most notable and unique characteristic of these quartz crystals is that many have the rare extra crystal face (seven sides instead of the normal six) which make them right or left handed. These prospects have been worked off and on since 1973, and many of the crystals have been sold to mineral collectors.

Walker Prospect Area, MRZ-3a (Talc-9): Consists of a small area underlain by Paleozoic metasedimentary rock, principally silty limestone, that contains minor impure talc lenses. Workings consist of a series of shallow bulldozer trenches that expose an altered shear zone that has developed within close proximity to the intrusive contact of the Joshua Flat quartz monzonite. Talc shows incomplete alteration, being both siliceous and containing mafic impurities. Although exposed talc is not of commercial grade, additional exploration along intrusive contact zone could delinate talc resources.

Oasis Pumice Area, MRZ-3a (Pumice-10): Is located 0.25 mile north of Gilbert Pass on the east side of Highway 168 and contains two small open pits. The open pits are developed in white, angular, water lain pumice and tuff that contains sand sized quartz and feldspar grains. This deposit of pumice, which was worked in the late 1940's and early 1950's, overlies light to medium gray Beer Creek quartz monzonite.

El Capitan-Crater Mine Area, MRZ-3a $^{(Gypsum-11)}$: The ter mine area has been the locus of intense hydrother- alteration. This alteration, consisting of a mixture of ur, gypsum, and siliceous sinter, is the result of pro- es related to the vapor phase of a hot spring system colating upward through limestones and dolomites. n in the most intensely altered areas, relict bedding structures of the original limestone and dolomite are erved. Near orifices and vents, silicifiction and robrecciation are more intense. Throughout the Crater e area, sulfur, gypsum, and silica-bearing sinter vents found along major fault zones.

The largest gypsum masses in the area occur at the El itan mine and are well exposed in the east and west pits, and in the mine workings below the east and t pits. They are associated with two zones of fractured brecciated dolomite and dolomitic limestone of the anza King Formation with replacement by gypsum g the most characteristic country rock alteration in mine area. The two large gypsum masses are roughly nel shaped in vertical section and elongate in a north- herly direction parallel to the breccia zones. Smaller, ated gypsum deposits outcrop north of the mine and as ontinuous outcrops for several thousand feet along a t zone northeast of the mine (Hill, 1972).

Eureka-Saline Carbonate and Siliceous Rocks, MRZ-3a $^{1,2)}$: The areas containing carbonate rock (MRZ-3a$^{(Ls-1)}$ MRZ-3a$^{(Ls-2)}$, Plates 3A and 3b) cover large portions of Eureka-Saline Valley Area. The areas shown as MRZ- $^{s-1)}$ contain carbonate rock that is predominantly lime- e of Devonian to Mesozoic age (Tin Mountain estone, Keeler Canyon Formation and the Bird Spring mation). Although there has been only minor produc- from these formations in adjoining quadrangles, pro- ion has been realized from similar age carbonate rock where in California. The major limestone producing osits in the western United States, which account for t of the carbonate rock production, are in these or lar age rocks. As a consequence, this area could con- important resources.

The areas shown as MRZ-3a$^{(Ls-2)}$ contain carbonate that is predominantly dolomite of Precambrian to ovician age (Reed Dolomite, Poleta Formation, Mule ngs, Monola Formation, Bonanza King Formation, ah Formation, Pogonip Limestone, Badger Flat Lime- e, Ely Springs Dolomite, Hidden Valley Dolomite and Lost Burro Formation). Carbonate rocks of these ages e produced dolomite in the Eureka-Saline Valley Area other areas of California and the western United es; and, as a consequence, this area could contain urces of carbonate rock.

The areas shown as MRZ-3a$^{(Si-1)}$ (Plates 3A, 3B, 3C) ain Eureka Quartzite and Johnson Spring Formation, ch are massive white to medium-gray quartzites that e some shale and clay layers. The Eureka Quartzite of dle Ordovician age is a remarkably uniform formation is widespread in the Basin and Range area. The Eu- Quartzite is also the only quartzite mined in Califor- that is known to be suitable for making super duty a brick (Ver Planck, 1966). Thus, these areas could esent an important resource for silica.

The areas identified as MRZ-3a$^{(Si-2)}$ (Plates 3A, 3B, 3C) contain bedded quartzite of the Zabriske Quartzite and Saline Valley Formation. The Zabriske Quartzite and Saline Valley Formation in the 1 x 2 degree sheet ranges from predominantly white to purplish gray and contains some micaceous and feldspathic layers. It is not known if the quartzite is of sufficient quality to be of commercial value.

Northern Death Valley area, MRZ-3a $^{(Bo-13)}$: The southern and central Death Valley regions have been long been producers of borate compounds. McAllister (1970) describes the principal borate deposits to be in continental sedimentary rocks near the base of the Furnace Creek Formation. In 1987-1988, U.S. Borax drilled four deep exploration holes in sections 26, 27, 33 and 34 in search of borate mineralization. Anomalous values of boron were discovered in continental sedimentary sequences in several of the drill holes (Dixie Hambrick, U.S. Borax, personal communication, 1988). Based upon these anomalous values this area has been classified as having potential for the occurrence of borate mineralization.

Areas Classified MRZ-3b

Deep Springs Valley Playa, MRZ-3b $^{(Na,K-1)}$: This area encircles Deep Springs Lake (classified MRZ- 2b$^{(Na, K-2)}$) and encompasses the broad area within the floor of the valley underlain by Quaternary lake sediments. Deep Springs Valley is a north-northeast trending valley that currently is a closed basin with drainage flowing to the south-southwest and culminating in Deep Springs Lake. However, in Pliocene-Pleistocene time, Deep Springs Valley drained eastward through Soldier Canyon into Eureka Valley. Subsequent basin and range faulting accompanied by uplift and tilting of fault blocks cut this drainage off with the resultant formation of the current internally drained basin. Thus, these structural adjustments present the potential for having concentrated sodium and potassium compounds within other transitory structural lows within this area.

Eureka Valley Playa Deposits, MRZ-3b $^{(Na,Li-2)}$: This area occupies the floor of Eureka Valley but is outside of the area shown as playa deposits MRZ-3A$^{(U, Li-3)}$. During the Pliocene-Pleistocene Eureka Valley was receiving surficial runoff from Deep Springs Valley via Soldier Canyon; thus, in all probability the active playa was a lot larger during that period of time than it is today. Subsequent basin and range faulting, accompanied by uplift and fault block tilting, has modified and altered the drainage within Eureka Valley. These structural adjustments present the potential for having playa deposits underlying areas surficially covered by recent alluvial, colluvial or dune sand deposits.

Northern Death Valley Area, MRZ-3b $^{(Bo-3)}$: This area occupies the floor of Death Valley southward of the area classified MRZ-3a $^{(Bo-13)}$ on the basis of exploration drilling by U.S. Borax which encountered anomalous values of boron within continental sediments. Subsequent basin and range faulting, in conjunction with lateral offset along the Furnace Creek fault zone, has modified and altered the drainage within Death Valley. These structural adjustments, occurring since continental facies deposition, present the potential for having favorable borate depositional facies underlying areas surficially covered by Recent alluvial, colluvial or eolian dune-sand deposits.

MINERAL LAND CLASSIFICATION WITHIN WILDERNESS STUDY AREAS

Land-use competition in the study area has increased dramatically over the last ten to fifteen years, mainly as a result of Southern California growing and a very mobile population which has greatly accelerated land demand for a variety of purposes, many of which conflict with mining. An increasing awareness of the wilderness values of the land has resulted in the establishment of the National Wilderness System in which mining would be prohibited. As a consequence, the Federal government and local lead agencies have found it necessary to develop plans establishing suitable areas for specific land use.

Five Federal government wilderness study areas (WSA's) are located in and comprise a large portion of the Eureka-Saline Valley SMARA study area, as shown in Figure 2. These WSA's are (1) Saline Valley (BLM No. CDCA-117), (2) Lower Saline (BLM No. CDCA-117A), (3) Little Sand Spring (BLM No. CDCA-119), (4) Hunter Mountain (BLM No. CDCA-123) and (5) Inyo Mountains (BLM No. CDCA-122). Mineral resource evaluation reports prepared by the U.S. Bureau of Mines and the U.S. Geological Survey were available for these WSA's and were utilized as a source of data in the preparation of this report.

Information gathered for the Mineral Land Classification study of the Eureka-Saline Valley study area have revealed that favorable terranes exist for significant mineral deposits within the Saline Valley, Inyo Mountains, Hunter Mountain, and Little Sand Spring WSA's. In order of potential economic importance, these terranes are:

- The Inyo Mountains WSA encompasses an area that has been identified by the U.S. Bureau of Mines as containing gold and silver properties that have an inferred 4.4 million tons of gold reserves and 280,000 tons of silver resources that contain 1.1 million ounces of gold and 3.2 million ounces of silver and has been classified MRZ-2b$^{(h-1)}$. In addition, the Inyo Mountains WSA contains an estimated 640,000 tons of steatite grade talc within two zones that has been classified MRZ-2b$^{(Talc-4)}$ and MRZ-2b$^{(Talc-5)}$ respectively.
- The Saline Valley WSA encompasses an area within the Last Chance Range, classified MRZ- 2b$^{(h-3)}$ for hosting potential epithermal gold mineralization and MRZ-3a$^{(h-1)}$ for potential mercury mineralization. Also extensive resources of carbonate and siliceous rock exist within the WSA.
- The Little Sand Spring WSA contains an area lying between the Sylvia mine and the Death Valley National Monument that has been classified MRZ-3a$^{(h-12)}$ for hosting potential epithermal gold mineralization and classified MRZ-3a $^{(Bo-13)}$ for potential borate mineralization
- The Hunter Mountain WSA contains an area alor its eastern boundary with the Death Valley National Monument that is underlain by a meta- sedimentary-igneous contact zone that may contain upwards of 200 million tons of wollastoni classified MRZ-2b$^{(Wollastonite-3)}$.

Due to the fact that such a large portion of this study area is proposed for wilderness, numerous prospects which have been classified as MRZ-3a's exist within these proposed WSA's. All of the areas classified as MRZ-3a are favorable target areas for mineral exploration. Consequently, we can expect that mineral discov eries will be made as a result of further exploration within some of them. Thus, the MRZ-3a areas should b given special consideration at the time that the classification information is incorporated in the general plan.

SUMMARY

- Evaluation of the Eureka-Saline Valley SMARA study area shows that four genetic classes of mineral deposits are present, or likely to be present, in sufficient concentrations to be of economic significance. These are: (1) deposits formed by hydrothermal processes (gold, silver ar associated base metals); (2) industrial minerals formed by diverse processes (talc, salt, borates, wollastonite and carbonate rock); (3) deposits formed by contact metasomatism (tungsten and associated metals), and (4) placer deposits (gold).
- Precious and base metal deposits formed through hydrothermal processes occur throughout the study area; however, the greatest concentration o significant gold and silver mineralization occurs along the eastern side of the Inyo Mountains within the historic Beveridge and Cerro Gordo mining districts. The quartz-vein-hosted deposits in these districts have yielded substantial amoun of gold and silver in past years, and a recent stud by U.S. Bureau of Mines delineated inferred gold and silver reserves exceeding $578 million at current precious metal prices of $485 per ounce fo gold and $7.00 per ounce for silver in the Beveridge area. The gold mineralization typically occurs in quartz veins enclosed by quartz monzonite. Near the surface the veins are primarily leached, drusy quartz with gold; at depth the gold occurs as discrete particles and as particles associated with abundant base metal sulfides. Silver-bearing veins are mainly in calcareous, dolomitic sedimentary rocks that were fractured, deformed, and metamorphosed by granitic rocks, or basic dikes within a northwest trending zone along the eastern flank of the Inyo Mountains. Th veins are composed mainly of breccia and drusy quartz; and where unoxidized, complex silver sulfides, with varying amounts of base metals an gold are present.
- Talc deposits have formed along or closely adjacer to several intrusive contact zones within the region. In most instances, the talc is an alteration

product of Paleozoic age calcareous, dolomitic sedimentary rocks, although in isolated cases talc has formed from the alteration of quartzites and/or the steatization of granitic rocks. Analytical testing indicates that the talc is a mixture of both steatite and non-steatite grade material, typically marketed to ceramic tile or cosmetic manufacturers.

- Deposits, formed by evaporative processes, containing salt, borates, sodium and potassium compounds, exist within the internally drained basins of the area. Extensive indicated reserves exist that may prove to be economically extractable in the future.
- Carbonate rock is present in small (less than several thousand feet long) to large (more than several miles long) masses consisting of limestone, dolomite, and marble of variable composition. Only minor historic production has been recorded within the study area; however age and composition equivalent carbonate rocks have been extensively mined elsewhere in the desert region. Thus, these units could represent important resources of carbonate rock suitable for a number of industrial uses.
- Placer gold exists in remnants of Tertiary age channel deposits in several localities in the study area as well as in modern stream beds. Although both types of placers have had minor historic production, it is doubtful if economic conditions could make mining these deposits economically feasible in the near future.

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SELECTED REFERENCES

›ers, J., and Stewart, J., 1972, Geology and mineral deposits of Esmeralda County, Nevada: Nevada Bureau of Mines and Geology Bulletin 78, 80 p.

bury, L.E., 1908, The Copper Resources of California: California Division of Mines Bulletin 50, 366 p.

iley, G.E., 1902, The saline deposits of California: California Division of Mines Bulletin 24, 216 p.

teman, P.C., Clark, L.C., Huber, N.K., Moore, J.C., and Rinehart, C.D., 1963, The Sierra Nevada Batholith-A synthesis of recent work across the central part: U.S. Geological Survey Professional Paper 414-D, p. D1-D46.

rger, B.R., and Eimon, P.I., 1983, Conceptual models of epithermal precious metal deposits, in Shanks, W.C., III, ed., Cameron volume on unconventional mineral deposits: New York, Society of Mining Engineers, p. 191-205.

rger, B.R., and Silberman, M.L., 1985, Interrelationship of chemical and physical morphologies in epithermal precious metal deposits in Berger, B.R., and Bethke, P.M., editors, Geology and geochemistry of epithermal systems: Chapter 9, Review in Economic Geology, v. 2.

wen, O.E., Gray, C.H., Jr., and Evans, J.R., 1973, The mineral economics of the carbonate rocks, in Bowen, O.E., editor, Limestone and dolomite resources of California: California Division of Mines Bulletin 194, 60 p.

anner, G.C., 1959, Sulfur in California and Nevada: U.S. Bureau of Mines Information Circular IC 7898, 50 p.

ner, W.D., 1980, Geology of part of the Cucomungo area, Esmeralda County, Nevada: M.S. Thesis, University of Nevada-Reno.

rchard, Horatio C., 1881, Report of the Director of the Mint upon the production of the precious metals in the United States during the calendar year 1880.

rchard, Horatio C., 1882, Report of the Director of the Mint upon the production of the precious metals in the United States during the calendar year 1881.

rchard, Horatio C., 1884, Report of the Director of the Mint upon the production of the precious metals in the United States during the calendar year 1883.

rchard, Horatio C., 1885, Report of the Director of the Mint upon the production of the precious metals in the United States during the calendar year 1884.

rchfiel, B.C., 1969, Geology of the Dry Mountain quadrangle, Inyo County, California: California Division of Mines and Geology Special Report 99, 19 p.

ausey, J.D., and others, 1983, Mineral investigation of the Hunter Mountain Wilderness Study Area (BLM No. CDCA-123) Inyo County, California: U.S. Bureau of Land Management, 17 p.

alfant, W.A., 1933, The story of Inyo: Bishop, California Chalfant Press, 430 p.

esterman, C.W., 1956, Pumice, pumicite, and volcanic cinders in California: California Division of Mines Bulletin 174, p. 1-98.

dester, A.H., Engel, A.E.J., and Wright, L.A., 1964, Talc resources of the United States: U.S. Geological Survey Bulletin 1167, 61 p.

rk, L.W., and Clark, V.D., 1978, High mountains and deep valleys: The gold bonanza days, San Luis Obispo, California: Western Trails Publications, 191 p.

rk, W.B., 1970, Gold district of California: California Division of Mines and Geology Bulletin 193, 186 p.

Close, T.J., 1985, Mineral Resources of the Inyo Mountains Wilderness Study Area (BLM No. CDCA-122) Inyo County, California: U.S. Bureau of Mines Open-File Report MLA 18-85, 86 p.

Diggles, M.F., 1983, Map and interpretation of geochemical anomalies in the White Mountains, Blanco Mountain, Birch Creek, and Black Canyon Roadless Areas, White Mountains, California and Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-1361-B, scale 1:62,500.

Diggles, M.F., Blakely, R.J., Rains, R.L., and Schmauch, S.W., 1983, Mineral resource potential map of the Blanco Mountain and Black Canyon Roadless Areas, Inyo and Mono Counties, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1361-C, scale 1:62,500.

Diggles, M.F., Dellinger, D.A., Sutley, S.J., and Fey, D.L., 1982, Chemical data for samples of rock, stream sediment, and nonmagnetic dense-mineral concentrate in the White Mountains, Blanco Mountain, Birch Creek, and Black Canyon Roadless Areas, White Mountains, California and Nevada: U.S. Geological Survey Open-File Report 82-984, 188 p.

Elliot, G.S., Wrucke, C.T., and Nedell, S.S., 1984, K-Ar ages of Late Cenozoic volcanic rocks from the northern Death Valley region: Isochron/West, no. 40, p. 3-7.

Erick, J.H., 1948, Copper in California: California Division of Mines Bulletin 144, p. 238-275.

Erickson, R.L., Van Sickle, G.H., Nakagawa, H.M., McCarthy, J.H., Jr., and Leong, K.W., 1966, Gold geochemical anomaly in the Cortez District, Nevada: U.S. Geological Survey Circular 534, 9 p.

Gale, H.S., 1914, Salt, borax, and potash in Saline Valley, Inyo County, California: U.S. Geological Survey Bulletin 540, p. 416-421.

Goodyear, W.A., 1888, Eighth Report of the State Mineralogist: California State Mining Bureau, v. 27, 582 p.

Green, L.W. and Latschar, J.A., 1981, Historic Resource Study - A History of Mining in Death Valley National Monument: National Park Service, United States Department of the Interior, v. 1 and II, 1036 p.

Hall, W.E., 1971, Geology of the Panamint Butte Quadrangle, Inyo County, California: U.S. Geological Survey Bulletin 1299, 67 p.

Hall, W.E., and Mackevett, E.M., 1958, Economic geology of the Darwin Quadrangle, Inyo County, California: California Division of Mines Special Report 51, 73 p.

Hall, W.E., 1962, Geology and ore deposits of the Darwin Quadrangle, Inyo County, California: U.S. Geological Survey, Professional Paper 368, 87 p.

Hall, W.E., and Stephens, H.G., 1963, Economic geology of the Panamint Butte Quadrangle and Modoc district, Inyo County, California: California Division of Mines and Geology Special Report 73, 39 p.

Hanks, H.G., 1882, On the occurrence of salt in California and its manufacture: California State Mining Bureau, 2nd Report of the State Mineralogist, p. 63-398.

Herron, C.R., 1980, Geology and structure of the Ace Hills, Inyo and Esmeralda counties, California-Nevada: M.A. Thesis, Fresno State University, 117 p.

Hill, R.L., 1972, Geology and geochemistry of El Capitan Mercury mine, Last Chance Range, Inyo County, California: M.S. Thesis, University of California, Los Angeles, 144 p.

Jenkins, O.P., 1957, Tabulation of lead and zinc deposits in California: California Journal of Mines and Geology, v. 53, nos. 3 and 4, p. 451-569.

Knopf, Adolph, 1914, Mineral Resources of the Inyo and White Mountains, California, in Contributions to Economic Geology, 1912, Part 1, metals and nonmetals, except fuels: U.S. Geological Survey Bulletin, p. 81-120.

Krauskopf, K.B., 1971, Geologic map of the Mt. Barcroft 15-minute quadrangle, California-Nevada: U.S. Geological Survey Map GQ-960, scale 1:62,500.

Leszcykowski, Andrew, 1985, Mineral Resources of the Panamint Dunes Wilderness Study Area (BLM No. CDCA-127), Inyo County, California: U.S. Geological Survey Open-File Report 84-678, 11 p.

Logan, C.A., 1947, Limestone in California: California Journal of Mines and Geology, v. 43, no. 3, p. 175-357.

Lombardi, O.W., 1964, Observations on the distribution of chemical elements in the terrestrial saline deposits of Saline Valley, California: Naval Ordinance Test Station, China Lake, California, Technical Publication 2916.

Lydon, P.A., 1957, Sulfur and sulfuric acid in Mineral commodities of California: California Division of Mines and Geology Bulletin 176, p. 613-622.

Lynton, E.D., 1938, Sulphur deposits in Inyo County, California: California Journal of Mines and Geology, v. 34, p. 563-590.

Marsh, S.P., 1986, Crater, California: A case study of applied geo-Chemical modeling techniques in Simon M. Cargill and Steven B. Green, Editors, Prospects for mineral resource assessments on public lands: Proceedings of the Leesburg workshop: U.S. Geological Survey Circular 980,p. 194-201.

McAllister, J.F., 1955, Geology of mineral deposits in the Ubehebe Peak quadrangle, Inyo County, California: California Division of Mines Special Report 42, 63 p.

McAllister, J.F., 1956, Geology of the Ubehebe Peak quadrangle, California: U.S. Geological Survey Geologic Quadrangle Map GQ-95, scale 1:62,500.

McCoard, D.C., 1970, Structure of the Last Chance thrust in the Last Change Range, California: M.S. Thesis, University of California, Los Angeles, 108 p.

McHugh, E.L., Gaps, R.S., Causey, J.D., and Rumsey, C.M., 1984, Mineral resources of the Saline Valley Wilderness Study Area (BLM No. CDCA-117), Inyo County, California: U.S. Bureau of Mines MLA 16-84, 41 p.

McKee, E.H., 1985, Geologic Map of the Magruder Mountain quadrangle, Esmeralda County, Nevada, and Inyo County, California: U.S. Geological Survey Geologic Quadrangle Map GQ-1587, scale 1:62,500.

McKee, E.H., and Nelson, C.A., 1967, Geologic map of the Soldier Pass quadrangle, California and Nevada: U.S. Geological Survey Geologic Quadrangle Map GQ-654, scale 1:62,500.

McKee, E.H., Diggles, M.F., Donahoe, J.L., and Elliott, G.S., 1982, Geologic map of the White Mountains Wilderness and Roadless Areas, California and Nevada: U.S. Geological Survey Miscellaneous Field Studies Map MF-1361-A, scale 1:62,500.

McKee, E.H., and Nash, T.B., Potassium argon ages of granitic rocks in the Inyo batholith, east-central California: Geological Society of America Bulletin, v. 78, no. 5, p. 669-680.

Merriam, C.W., 1963, Geology of the Cerro Gordo mining district, Inyo County, California: U.S. Geological Survey Professional Paper 408, 83 p.

Miller, M.S., 1983, Mineral investigation of the Little Sand Spring Wilderness Study Area (BLM No. CDCA-119), Inyo County, California: U.S. Bureau of Mines MLA 103-83, 14 p.

Morgan, J.D., 1962, Lower Cambrian-Precambrian succession, White-Inyo Mountains, California: Geological Society of America Bulletin, v. 73, no. 1, p. 139-144.

Morgan, J.D., 1969, Lithologic log, lithium content, and mineralo of sediments penetrated in test boring drilled in Eureka Valle Inyo County, California: U.S. Geological Survey Open-File R port 79-1089, 13 p.

Nelson, C.A., 1966, Geologic map of the Blanco Mountain qua rangle, Inyo and Mono Counties, California: U.S. Geologic Survey Geologic Quadrangle Map GQ-529, scale 1:62,500.

Nelson, C.A., 1966, Geologic map of the Waucoba Mountain qua rangle, Inyo County, California: U.S. Geological Survey Geolog Quadrangle Map GQ-528, scale 1:62,500.

Nelson, C.A., 1971, Geologic map of the Waucoba Spring qua rangle, Inyo County, California: U.S. Geological Survey Geolog Quadrangle Map GQ-921, scale 1:62,500.

Norman, L.A., Jr., and Stewart, R.M., 1951, Mines and mine resources of Inyo County: California Journal of Mines and Ge ogy, v. 47, no. 1, p. 17-223.

Page, B.M., 1951, Talc deposits of steatite grade, Inyo Coun California: California Division of Mines Special Report 8, 35 p

Papke, K.G., 1975, Talcose minerals in Nevada: Talc, chlorite, a pyrophyllite: Nevada Bureau of Mines Bulletin 84.

Partridge, J.F., 1941, Tungsten Resources of California: Califor Division of Mines Report 37.

Radtke, A.S., Rye, R.O., and Dickson, F.W., 1980, Geology a stable isotope studies of the Carlin gold deposit, Nevac Economic Geology, v. 75, p. 641-672.

Ross, D.C., 1967a, Generalized geologic map of the Inyo Mountai regions, California: U.S. Geological Survey Miscellaneo Geologic Investigations Map I-506, scale 1:125,000.

Ross, D.C., 1967b, Geologic map of the Waucoba Wash qua rangle, Inyo County, California: U.S. Geological Survey Geolog Quadrangle Map GQ-612, scale 1:62,500.

Ross, D.C., 1969, Descriptive petrography of three large gran bodies in the Inyo Mountains, California: U.S. Geological Surv Professional Paper 601, 47 p.

Ross, D.C., 1970, Pegmatitic trachyandesite plugs and associat volcanic rocks in the Saline Range-Inyo Mountains region, Calif nia: U.S. Geological Survey Professional Paper 614-D, p. D1-D29.

Robison, J.H., 1964, Geology of the northwest portion of the Wa coba Spring quadrangle, Inyo Mountains, California: M.A. Th sis, University of California, Los Angeles, 69 p.

Rumsey, C.M., 1983, Mineral investigations of the Lower Sali Wilderness Study Area (BLM No. CDCA-117A), Inyo Coun California: U.S. Bureau of Mines Mineral Land Assessment M 1-84, 10 p.

Sampson, R.J., Tucker, W.B., 1940, Thirty-sixth report of the Sta Mineralogist: California Journal of Mines and Geology, v. 36, 2, p. 117-156.

Schilling, J.H., 1962, An Inventory of molybdenum occurrences Nevada: Nevada Bureau of Mines Report 2.

Schilling, J.H., 1977, Index to core and cuttings: Nevada Bureau Mines Report No. 30.

Schilling, J.H., 1979, Molybdenum resources of Nevada: Neva Bureau of Mines Open File Report 79-3.

Schmauch, S.W., 1986, Mines and prospects, White Mounta roadless area, Inyo and Mono counties, California, and Esmeral and mineral counties, Nevada: U.S. Geological Survey MF-13 F, 27 p. 1 plate, scale 1:62,500.

Silberman, M.L., 1982, Hot spring type, large tonnage, low-gra gold deposits, in characteristics of mineral deposit occurrenc U.S. Geological Survey Open-File Report 82-795, p. 131-14 th, Tingley, Bentz, Garsib, Papke, and Quate, 1983, A Mineral nventory of the Esmeralda-Stateline Resource area: Nevada Bureau of Mines Open File Report 83-11.

wart, J.H., 1965, Precambrian and Lower Cambrian formations n the Last Chance Range area, Inyo County, California, in Cohee, G.V., and West, W.S., Changes in stratigraphic nomen- lature by the U.S. Geological Survey, 1964: U.S. Geological Survey Bulletin 1224-A, p. A60-A70.

wart, J.H., 1967, Possible large right-lateral displacement along ault and shear zones in the Death Valley-Las Vegas area, California and Nevada: Geological Society of America Bulletin, v. 78, p. 131-142.

wart, J.H., 1970, Upper Precambrian and Lower Cambrian strata n the southern Great Basin, California and Nevada: U.S. Geo- ogical Survey Professional Paper 620, 206 p.

wart, J.H., Ross, D.C., Nelson, C.A., and Burchfiel, B.C., 1966, Last Chance thrust—a major fault in the eastern part of Inyo County, California, in Geological Survey Research, 1966: U.S. Geological Survey Professional Paper 550-D, p. D23-D34.

wart, J.H., Robinson, P.T., Albers, J.P., and Crowder, D.W., 1974, Geologic map of the Piper Peak quadrangle, Nevada-California: U.S. Geological Survey Map GQ-1186, scale 1:62,500.

son, M., 1984, Mineral commodity report-sulfur: California Division of Mines and Geology Special Publication 74, 18 p.

ker, W.B., 1926, Twenty-second report of the State Mineralogist: California State Mining Bureau, v. 22, no. 1, p. 463-531.

ker. W.B., 1927, Twenty-third report of the State Mineralogist: California State Mining Bureau, v. 27, 582 p.

ker, W.B., 1931, Note on mining activity in Inyo and Mono Counties in July, 1931: Twenty-seventh report of the State Mineralogist, California Division of Mines, p. 543-545.

ker, W.B., and Sampson, R.J., 1938, Mineral resources of Inyo County: California Journal of Mines and Geology, v. 34, no. 4, p. 368-500.

. Bureau of Mines and U.S. Geological Survey, 1980, Principles of a reserve/resource classification: U.S. Geological Survey Circular 831, 5 p.

. Geological Survey, 1983, Aeromagnetic survey of the Eureka and Saline Valley areas, California and Nevada: U.S. Geological Survey Open File Report 83-653, scale 1:250,000.

Vernon, J.W., 1951, California sources of sulfur and sulfuric acid, in Minerals useful to California agriculture: California Division of Mines Bulletin 155, p. 129-130.

Ver Planck, W.E., 1957, Salt in California: California Division of Mines Bulletin 175, 168 p.

Waring, C.A., and Huguenin, Emile, 1917, Inyo County: California State Mining Bureau Report 15, p. 29-134.

Watson, L.W., 1984, Felise Prospect, Inyo County, California: Intermountain Resources, Consulting Report (unpublished).

Watson, L.W., 1984, Juanita Prospect, Inyo County, California: Intermountain Resources, Consulting Report (unpublished).

Weiler, C.T., 1966, Summary Report of minerals examination of Crater Sulfur mine, Inyo County, California: U.S. Bureau of Mines Field Report (unpublished, on file at U.S.B.M. Spokane Field Office).

White, D.E., 1981, Active geothermal systems and hydrothermal ore deposits, in Skinner, B.J., editor, Economic Geology, v. 75, p. 392-423.

White, D.E., and Roberson, C.E., 1962, Sulphur Bank, California, a major hot spring quicksilver deposit, in Petrologic studies: Geological Society of America Buddington volume, p. 397-428.

Wright, L.A., 1948, White Eagle talc deposit: An example of steatization of granite (abstract): Geological Society of America Bulletin, v. 59, p. 1385.

Wright, L.A., 1966, Talc and soapstone, in Mineral resources of California: California Division of Mines and Geology Bulletin 191, p. 414-420.

Wrucke, C.T., Werschky, R.S., Raines, G.L., Blakely, R.J., Hoover, D.B., and Miller, M.S., 1984, Mineral resource potential of the Little Sand Spring Wilderness Study Area, Inyo County, California: U.S. Geological Survey Open File Report 84-975, 20 p.

Wrucke, C.T., 1981, unpublished mapping of a portion of the Ubehebe Crater 15-minute quadrangle.

Wrucke, C.T., 1981 unpublished mapping of the Last Chance Range 15-minute quadrangle.

Zellmer, J.T., 1980, Recent deformation in the Saline Valley region, Inyo County, California: PhD dissertation, University of Nevada, Reno, 168 p.

Numerical Listing and MRZ Cross Reference of Mines and Prospects Located in the Eureka-Saline SMARA Study Area

MINE #	MINE NAME	LOCATION	COMMODITIES	MRZ	PAGE #
1	Buck Mine (Kakuno, Lucky Boy)	5S 36E 30	Gold	MRZ-3a$^{(h-4)}$	95
2	Brown Rock #1	5S 37E 30	Gold	MRZ-3a$^{(h-4)}$	95
3	Unknown	5S 37E 31	Gold	MRZ-3a$^{(h-4)}$	95
4	Mono-Inyo Mine	5S 37E 32	Gold	MRZ-3a$^{(h-4)}$	95
5	Unknown	6S 37E 5	Gold?	MRZ-3a$^{(h-4)}$	95
6	Unknown	6S 36E 2	Gold, Silver, Lead	MRZ-3a$^{(h-4)}$	96
7	Copper Queen	6S 37E 7	Copper, Tungsten	MRZ-3a$^{(s-1)}$	114
8	Gough #5	6S 36E 11	Silver(?)	MRZ-3a$^{(h-4)}$	96
9	Nealy	6S 36E 12	Silver(?)	MRZ-3a$^{(h-4)}$	96
10	Unknown	6S 36E 14	Silver(?)	MRZ-3a$^{(h-4)}$	96
11	Inyo Boy #2 (Railroad Lady)	6S 37E 8	Siver, Copper	MRZ-3a$^{(h-3)}$	93
12	Inyo Boy #5	6S 37E 8	Silver, Copper	MRZ-3a$^{(h-3)}$	93
13	Inyo Boy #1	6S 37E 8	Silver, Copper	MRZ-3a$^{(h-3)}$	93
14	Inyo Boy #6	6S 37E 8	Gold, Silver, Copper?	MRZ-3a$^{(h-3)}$	93
15	Oasis (Cornucopsia) Pumice	6S 37E 8	Pumice	MRZ-3a$^{(Pumice-10)}$	137
16	Unknown	6S 37E 18	Gold	MRZ-3a$^{(h-4)}$	96
17	Unknown	6S 37E 13	Gold	MRZ-3a$^{(h-4)}$	97
18	Fringe Benefit #1 (Lincoln, Silver Dome)	6S 37E 18	Silver	MRZ-3a$^{(h-4)}$	97
19	Cliff (Space Age #13)	6S 36E 13	Copper, Silver, Copper	MRZ-3a$^{(h-4)}$	97
20	Piper Mtn Copper Mine	6S 37E 16	Copper	MRZ-3a$^{(h-3)}$	93
21	Unknown	6S 37E 15	Gold, Silver	MRZ-3a$^{(h-3)}$	93
22	Unknown	6S 37E 15	Gold	MRZ-3a$^{(h-3)}$	94
23	Piper	6S 37E 23	Gold?	MRZ-3a$^{(h-3)}$	94
24	Piper	6S 37E 22	Gold, Silver	MRZ-3a$^{(h-3)}$	94
25	Piper	6S 37E 23	Gold?	MRZ-3a$^{(h-3)}$	94
26	Sugarloaf Mt . Prospect (Piper)	6S 37E 22	Copper, Silver, Copper	MRZ-3a$^{(h-3)}$	94
27	AJA Tungsten Claims	6S 38E 14	Tungsten	MRZ-3a$^{(h-15)}$	109
28	Midnite #3-4	6S 38E 25	Tungsten	MRZ-3a$^{(s-2)}$	115
29	Moon Mining Co	6S 38E 25, 26	Tungsten	MRZ-3a$^{(s-2)}$	115
30	Unknown	6S 37E 27		MRZ-4	138
31	Silver Queen Prospect	6S 36E 33	Gold, Silver	MRZ-3a$^{(h-4)}$	97
32	Eureka Silver #1-5	6S 37E 34	Gold	MRZ-3b$^{(p-1)}$	126
33	Eureka Silver #4	6S 37E 34	Gold?	MRZ-3a$^{(h-11)}$	107
34	White Elephant	7S 37E 6	Gold?	MRZ-3a$^{(h-11)}$	107
35	Lakeview Prospect	7S 36E 4	Gold, Silver	MRZ-3a$^{(h-4)}$	98
36	Kesef Prospect	7S 36E 5	Gold	MRZ-3a$^{(h-4)}$	98
37	Thunder Bird Group	7S 36E 8	Gold, Silver	MRZ-3a$^{(h-4)}$	98
38	Tungstar	7S 36E 7	Gold, Silver	MRZ-3a$^{(h-4)}$	98
39	Valley View #1-5	7S 37E 9	Copper, Silver?	MRZ-3a$^{(h-11)}$	107
40	Eureka Copper #8-12	7S 37E 8	Copper	MRZ-3a$^{(h-11)}$	107
41	Lipp Prospect	7S 37E 18	Silver, Gold, Lead	MRZ-3a$^{(h-11)}$	108
42	Midway Group	7S 39E 10	Gold	MRZ-3a$^{(s-2)}$	115
43	Midway Skarn (Copper World, patented)	7S 39E 10	Copper	MRZ-3a$^{(s-2)}$	115

MINE #	MINE NAME	LOCATION	COMMODITIES	MRZ	PAGE
44	Nev-Cal Copper #1	7S 39E 10	Copper	MRZ-3a$^{(s-2)}$	116
45	Nev-Cal Copper #1	7S 39E 10, 14, 15	Tungsten, Copper	MRZ-3a$^{(s-2)}$	116
46	Nev-Cal Copper #1	7S 39E 10	Tungsten, Copper	MRZ-3a$^{(s-2)}$	116
47	Joker #77	7S 39E 14	Tungsten, Copper	MRZ-3a$^{(s-2)}$	116
48	Joker #70	7S 39E 13	Gold, Tungsten	MRZ-3a$^{(s-2)}$	116
49	Ford Prospect	7S 39E 14	Gold	MRZ-3a$^{(h-7)}$	104
50	Unknown	7S 39E 15	Gold	MRZ-3a$^{(h-7)}$	104
51	Copper Canyon (Kunkel) Claim	7S 39E 24	Gold, Copper	MRZ-3a$^{(s-2)}$	116
52	Clairs Heavy Lode 1	7S 39E 15	Gold?	MRZ-3a$^{(h-7)}$	104
53	Unknown	7S 39E 16	Gold?	MRZ-3a$^{(h-7)}$	104
54	Willow Spring Prospect	7S 39E 16	Gold?	MRZ-3a$^{(h-7)}$	104
55	Unknown	7S 37E 22	Copper?, Gold?	MRZ-4	138
56	Unknown	7S 37E 30	Gold?	MRZ-4	138
57	C & M #4	7S 40E 30	Copper	MRZ-3a$^{(s-2)}$	117
58	Alum Canyon Prospect	8S 40E 5	Tungsten	MRZ-3a$^{(s-2)}$	117
59	Claimar #5	7S 40E 6	Lead, Gold	MRZ-3a$^{(h-6)}$	103
60	Unknown	7S 39E 35	Gold	MRZ-3a$^{(h-6)}$	103
61	Milovitch #1	8S 39E 2	Gold	MRZ-3a$^{(h-6)}$	103
62	Milovitch Prospect	8S 39E 2	Gold	MRZ-3a$^{(h-6)}$	103
63	Bunker Hill (Milovitch)	8S 39E 2	Gold	MRZ-3a$^{(h-6)}$	104
64	Unknown	8S 39E 11	Mercury?	MRZ-3a$^{(h-6)}$	104
65	Rat #33	8S 40E 10	Gold	MRZ-3a$^{(h-8)}$	105
66	Lower Alum Creek Prospects (Amoco)	8S 40E 15	Gold	MRZ-3a$^{(h-8)}$	105
67	Victor Consolidated	8S 37E 10	Copper, Gold(?)	MRZ-3a$^{(s-3)}$	117
68	Victor #88	8S 37E 10	Gold(?)	MRZ-3a$^{(s-3)}$	117
69	Victor #1	8S 37E 15	Talc	MRZ-3a$^{(talc-2)}$	134
70	Cel Jemp	8S 36E 11	Gold	MRZ-3a$^{(h-14)}$	109
70A	Deep Springs Lake Potash (Inyo Chemical Company)	7S 36E 4,5,8	Sodium, Potassium	MRZ-2b$^{(Na, K-2)}$	129
71	MeJec	8S 36E 14	Gold	MRZ-3a$^{(h-14)}$	109
72	Rainbow Mine	8S 36E 14	Copper, Gold	MRZ-3a$^{(s-3)}$	118
73	Unknown	8S 36E 14	Tungsten	MRZ-3a$^{(s-3)}$	118
74	CBU Mine	8S 36E 24	Tungsten	MRZ-3a$^{(s-3)}$	118
75	Scheelite Group	8S 37E 19	Tungsten, Copper	MRZ-3a$^{(s-3)}$	118
76	Loretto Mine (Bristlecone Copper Co)	8S 37E 16	Copper	MRZ-2b$^{(h-6)}$	91
77	Nicolaus-Eureka	8S 37E 21	Talc	MRZ-3a$^{(talc-2)}$	134
78	Lime Hill Limestone	8S 37E 20	Limestone	MRZ-3a$^{(Ls-2)}$	137
79	Unknown	8S 37E 29	Talc	MRZ-3a$^{(talc-2)}$	134
80	Eureka Talc	9S 37E 29	Talc	MRZ-3a$^{(talc-2)}$	134
81	Harlis and Broady (D and D) Mine	8S 37E 29	Talc	MRZ-3a$^{(talc-2)}$	135
82	Green Rock #1	8S 37E 29	Talc	MRZ-3a$^{(talc-2)}$	135
83	Unknown	8S 35E 13	Gold	MRZ-3a$^{(h-19)}$	113
84	Iron Age Mine	8S 35E 24	Gold	MRZ-3a$^{(h-19)}$	113
85	CMB Lode	8S 36E 29	Gold	MRZ-3a$^{(h-19)}$	113
86	Uncle Adoph	8S 36E 35	Gold?	MRZ-4	138

NE #	MINE NAME	LOCATION	COMMODITIES	MRZ	PAGE #
7	Unknown	9S 39E 4	Gold?	MRZ-4	138
8	White Cloud	8S 39E 20	Mercury, Gold	MRZ-2b$^{(h-3)}$	86
9	El Capitan	8S 39E 22	Mercury	MRZ-2b$^{(h-4)}$	91
0	Lucky Strike	8S 39E 29	Uranium, Copper	MRZ-2b$^{(h-3)}$	86
1	M & G 4	8S 39E 25	Mercury	MRZ-2b$^{(h-3)}$	86
2	Tiki #6	8S 39E 26	Sulfur	MRZ-2b$^{(h-3)}$	86
3	Texas American #67-68	8S 39E 26	Sulfur	MRZ-2b$^{(h-3)}$	86
4	El Dorado Lode #6	8S 39E 35	Sulfur	MRZ-2b$^{(h-3)}$	87
5	Big El Dorado	8S 39E 35	Sulfur	MRZ-2a$^{(Sulfur-1)}$	127
6	Crater Mine	8S 39E 33	Sulfur	MRZ-2a$^{(Sulfur-1)}$	127
6A	Crater #1	8S 39E 33	Sulfur	MRZ-2a$^{(Sulfur-1)}$	127
7	Fraction and Southwest Sulphur Group	8S 39E 33	Sulfur	MRZ-2a$^{(Sulfur-1)}$	127
8	Gulch Group	8S 39E 33	Sulfur	MRZ-2a$^{(Sulfur-1)}$	127
9	Soliz & Vaseta	8S 39E 33	Sulfur	MRZ-2a$^{(Sulfur-1)}$	128
0	Unknown	8S 39E 33	Sulfur	MRZ-2a$^{(Sulfur-1)}$	128
1	Midas #5	8S 39E 33	Sulfur, Mercury, Gold(?)	MRZ-2b$^{(h-3)}$	87
2	Christopher #2 Prospect	8S 39E 33	Mercury(?)	MRZ-2b$^{(h-3)}$	87
3	Aloha Prospect	8S 39E 33	Mercury	MRZ-2b$^{(h-3)}$	87
4	Rebecca #4	9S 39E 4	Mercury, Gold	MRZ-2b$^{(h-3)}$	87
5	Rebecca #2	9S 39E 4	Mercury, Gold	MRZ-2b$^{(h-3)}$	88
06	Lucky 13	8S 39E 31	Mercury	MRZ-2b$^{(h-3)}$	88
07	Up & Down Mine	9S 39E 9	Mercury, Gold, Silver	MRZ-2b$^{(h-3)}$	88
08	Up & Down Mine #1-6	9S 39E 9	Mercury, Gold(?)	MRZ-2b$^{(h-3)}$	88
09	Mercury Knob Prospect	9S 39E 9	Mercury, Copper, Turquoise	MRZ-2b$^{(h-3)}$	89
10	Eureka Prospect (Bear Cat)	9S 39E 10	Mercury, Gold	MRZ-2b$^{(h-3)}$	89
11	Sulphur Queen	8S 39E 10	Sulfur	MRZ-2b$^{(h-3)}$	89
12	April Fool Prospect	9S 39E 9	Mercury	MRZ-2b$^{(h-3)}$	89
13	Storm Cloud	9S 39E 16	Mercury, Gold	MRZ-2b$^{(h-3)}$	90
14	Sally Joe Eureka Sulfur	9S 39E 12	Sulfur, Mercury	MRZ-2b$^{(h-3)}$	90
15	Silvia Mine (Silver Bowl)	7S 37E 1	Silver, Gold	MRZ-3a$^{(h-16)}$	109
16	Black Rock Prospect	7S 37E 27	Copper, Gold, Silver	MRZ-3a$^{(s-5)}$	123
17	Walker Prospect	9S 36E 25	Talc	MRZ-3a$^{(talc-9)}$	136
18	Try again	9S 36E 36	Talc?, Limestone	MRZ-4	138
19	Try again	9S 36E 36	Talc?, Limestone	MRZ-4	138
20	Coyote (Mystery, Rainbow)	9S 37E 31	Gold, Copper, Tungsten	MRZ-3a$^{(s-5)}$	123
21	Marble Canyon Placers	10S 37E 7,8, 9,10	Gold	MRZ-3a$^{(p-1)}$	125
22	Silver Spur (Daisy Mine)(Bedell Mine)	10S 37E 13,24	Lead, Gold, Zinc	MRZ-3a$^{(h-5)}$	100
23	Opal Mine	10S 37E 24	Lead, Silver, Zinc	MRZ-3a$^{(h-5)}$	100
24	Opportunity Prospect	10S 37E 20	Gold(?)	MRZ-3a$^{(h-5)}$	101
25	Fuller Prospect	10S 37E 30	Gold(?)	MRZ-3a$^{(h-5)}$	101
26	Lee Prospect (Lucky Hike)	10S 37E 30	Silver, Lead, Copper	MRZ-3a$^{(h-5)}$	101
27	Gingerbell "Apex" Prospect	10S 37E 29	Lead , Zinc, Silver(?)	MRZ-3a$^{(h-5)}$	101
28	August Prospect (Whippoorwill #1)	10S 37E 32	Zinc	MRZ-3a$^{(h-5)}$	101
29	Ruby Port	10S 37E 32	Silver, Lead, Copper,	MRZ-3a$^{(h-5)}$	101
30	Del #1 (Bonnie, Newcastle Prospect)	10S 37E 31	Copper, Gold Silver, Zinc	MRZ-3a$^{(h-5)}$	102

MINE #	MINE NAME	LOCATION	COMMODITIES	MRZ	PAGE
131	Hillside Prospect	10S 37E 23	Lead, Silver	MRZ-3a$^{(h-5)}$	102
132	Emma (Hillside #1) Prospect	11S 37E 4	Lead, Silver	MRZ-3a$^{(h-5)}$	102
133	Morning Star (Pine Tree Mine)	11S 37E 2	Lead, Silver	MRZ-3a$^{(h-5)}$	102
134	Desert View Prospect	10S 38E 3	Copper	MRZ-4	139
135	Lithium Occurrence	9S 39E 34	Lithium	MRZ-3a$^{(Li, U-3))}$	135
136	Titan Placer	10S 39E 1, 12,13	Sand	MRZ-3a$^{(Silica-4)}$	135
137	Leah-Vanessa	11S 40E 6	Gold	MRZ-3a$^{(h-2)}$	92
138	Jenny B	11S 40E 1	Gold, Silver, Copper	MRZ-3a$^{(h-2)}$	92
139	Unknown	8S 39E 2	Mercury?		
140	Unknown	8S 39E 11	Mercury, Limestone?	MRZ-3a$^{(ls-2)}$	137
141	Juanita Claim	10S 42E 6, 7,16	Gold	MRZ-3a$^{(h-12)}$	108
142	Six Pac	4S 35E 11	Gold	MRZ-3a$^{(h-4)}$	99
143	Jeff #2	4S 35E 14	Gold	MRZ-3a$^{(h-4)}$	99
144	Unknown	5S 36E 22	Gold	MRZ-3a$^{(h-4)}$	99
145	Unknown	5S 36E 15	Silver, Lead, Gold	MRZ-3a$^{(h-4)}$	99
146	Astro #1	5S 36E 24	Gold	MRZ-3a$^{(h-4)}$	100
147	Unknown	5S 36E 24	Gold	MRZ-3a$^{(h-4)}$	100
148	Overholtz	9S 36E 28	Silver, Gold	MRZ-4	139
149	Mineral Hill Group	8S 36E 29	Lead, Silver	MRZ-3a$^{(h-19)}$	113
150	Waucoba Tungsten Mine	11S 37E 21	Tungsten, Copper	MRZ-3a$^{(s-7)}$	124
151	Buckwheat #1-5	11S 37E 29	Tungsten	MRZ-3a$^{(s-7)}$	124
152	Saline Valley Quartz	11S 37E 28	Quartz	MRZ-3a$^{(Silica-8)}$	136
153	Emma #1-9	12S 37E 4	Lead, Silver(?)	MRZ-3a$^{(h-18)}$	112
154	Lucky Josephine #11 & 17	12S 37E 9	Lead, Silver	MRZ-3a$^{(h-18)}$	112
155	Bunker Hill Mine	12S 37E 5	Lead-Silver	MRZ-3a$^{(h-18)}$	112
156	Blue Monster Mine	12S 37E 20	Lead, Silver	MRZ-3a$^{(h-18)}$	112
157	Willow Creek Mine	13S 37E 32	Talc	MRZ-3a$^{(Talc-1)}$	133
158	White Eagle Mine	13S 37E 3	Talc	MRZ-2a$^{(Talc-2)}$	128
159	Grey Eagle (Eleanor)	13S 37E 10	Talc	MRZ-2a$^{(Talc-5)}$	132
160	Dorris Dee Talc Mine	13S 37E 14	Talc	MRZ-2b$^{(Talc-5)}$	132
161	Saline Valley Sand Dunes	13S 38E 33, 32, 34	Sand	MRZ-3a$^{(Silica-5)}$	135
162	Snowflake Talc Mine	14S 38E 18	Talc	MRZ-2b$^{(Talc-5)}$	132
163	Saline Valley Borax	14S 38E 22	Boron	MRZ-2b$^{(Na, Bo-1)}$	129
164	Saline Valley Salt	14S 38E 26	Sodium	MRZ-2b$^{(Na, Bo-1)}$	129
165	Big Silver	14S 38E 34	Silver	MRZ-2b$^{(h-1)}$	66
166	Black Diamond Prospect	13S 39E 4	Manganese, Tungsten	MRZ-3a$^{(h-13)}$	108
167	Coffee Stop Prospect	13S 39E 33	Mercury	MRZ-4	139
168	Ostrenger Pozzolan (White Cliffs)	11S 39E 3	Pozzolan	MRZ-3a$^{(Pz-7)}$	136
169	Lucky Rich Prospect	13S 39E 12	Copper	MRZ-3a$^{(s-8)}$	125
170	Blue Jay (Jarosite)	14S 40E 27	Copper, Molybdenum	MRZ-3a$^{(s-4)}$	119
171	Bonanza Prospect (Hesson Clipper)	15S 40E 10	Copper, Silver, Gold, Tungsten, Uranium	MRZ-3a$^{(s-4)}$	119
172	Lead King Group (Lippincott)	15S 40E 24	Lead, Silver, Copper, Molybdenum	MRZ-3a$^{(s-4)}$	120
173	Hidden Ledge Prospect	15S 41E 19	Copper, Lead, Silver	MRZ-3a$^{(s-4)}$	120

NE #	MINE NAME	LOCATION	COMMODITIES	MRZ	PAGE #
14	Unknown	15S 40E 24	Silver	MRZ-3a$^{(s-4)}$	120
15	Green Light Prospect	15S 40E 31	Silver	MRZ-3a$^{(s-4)}$	120
16	Windy Hill Prospect	15S 40E 31	Silver	MRZ-3a$^{(s-4)}$	121
17	Sunshine Prospect	15S 40E 31	Silver, Lead, Tungsten	MRZ-3a$^{(s-4)}$	121
8	Cupro Tungstite Prospect	15S 40E 30	Copper, Tungsten, Silver, Gold	MRZ-3a$^{(s-4)}$	121
9	Sal (Bee Em Tee) Group	15S 40E 36	Copper, Silver, Gold, Tungsten	MRZ-3a$^{(s-4)}$	121
0	Shirley Ann (Eureka)	16S 40E 1	Copper, Silver, Lead, Gold, Tungsten	MRZ-3a$^{(s-4)}$	122
1	Navajo Chief Prospect	16S 40E 1	Copper, Lead, Silver, Gold	MRZ-3a$^{(s-4)}$	122
2	Jack Rabbit Prospect	16S 40E 1	Copper, Tungsten	MRZ-3a$^{(s-4)}$	123
3	Tungsaline Prspect (Twin Sisters)	15S 41E 19	Gold, Silver, Tungsten	MRZ-3a$^{(s-4)}$	123
4	Monarch Mine	15S 41E 31	Gold, Silver, Tungsten	MRZ-3a$^{(h-17)}$	110
5	Unknown	15S 41E 33	Gold?	MRZ-3a$^{(h-17)}$	110
6	Tourmaline #1-4	16S 41E 4	Tourmaline, Copper	MRZ-3a$^{(h-17)}$	110
7	Green Quartz (Hourglass)	16S 41E 21	Copper	MRZ-3a$^{(h-17)}$	111
8	J O Mine (Calmet Group)	15S 41E 20	Wollastonite	MRZ-2b$^{(Wollas-3)}$	130
9	Palmer Prospect	15S 41E 20	Copper	MRZ-3a$^{(s-4)}$	123
0	Copper Queen-Lucky Boy	16S 40E 17	Copper	MRZ-3a$^{(h-9)}$	106
1	Cerrusite Mine	16S 40E 7	Lead, Silver	MRZ-3a$^{(h-9)}$	106
2	Pinion Extension (Birdspring Garnet)	16S 40E 7	Lead, Silver, Copper	MRZ-3a$^{(h-9)}$	106
93	May B Prospect	16S 40E 6	Lead, Silver, Copper	MRZ-3a$^{(h-9)}$	106
94	Anton & Pobst Mine (Birdspring Garnet)	16S 40E 6	Copper	MRZ-3a$^{(s-8)}$	124
95	Unknown	16S 40E 18	Lead, Silver	MRZ-3a$^{(h-9)}$	106
96	American Prospect	15S 39E 30	Silver	MRZ-2b$^{(h-1)}$	66
97	American Flag Prospect	15S 38E 9	Gold, Silver, Copper	MRZ-2b$^{(h-1)}$	66
98	Prospect 77	15S 38E 9	Silver, Gold, Copper, Lead	MRZ-2b$^{(h-1)}$	67
99	Trapier MIne	15S 38E 9	Gold, Silver, Lead	MRZ-2b$^{(h-1)}$	67
00	Prospect No. 78	15S 38E 16	Gold	MRZ-2b$^{(h-1)}$	67
01	Craig Canyon	15S 38E 7		MRZ-2b$^{(h-1)}$	67
02	Hunter Arrastres	14S 38E 31	Gold, Silver, Copper, Lead	MRZ-2b$^{(h-1)}$	68
03	Loadstar Prospect	15S 38E 6	Copper	MRZ-2b$^{(h-1)}$	68
04	Gold Standard Mine	14S 38E 32	Silver, Gold, Copper	MRZ-2b$^{(h-1)}$	68
05	Spring Mine	14S 38E 29	Gold	MRZ-2b$^{(h-1)}$	68
06	Prospect No. 62	14S 38E 30	Gold	MRZ-2b$^{(h-1)}$	69
07	Bighorn Mine area	14S 37E 36	Gold, Silver, Copper, Lead	MRZ-2b$^{(h-1)}$	69
08	Llano Del Oro Prospect	14S 37E 36	Copper	MRZ-2b$^{(h-1)}$	69
09	Gavalan Mine area	14S 37E 36	Gold	MRZ-2b$^{(h-1)}$	70
10	Burgess Mine area	15S 37E 13	Silver, Lead, Zinc, Gold	MRZ-2b$^{(h-1)}$	70
11	Prospect No. 72	15S 37E 12	Silver, Gold, Copper	MRZ-2b$^{(h-1)}$	70
12	Beveridge Canyon MN No. 26 Prospect	14S 37E 35	Gold	MRZ-2b$^{(h-1)}$	71
13	Beveridge Canyon MN Prospect	14S 37E 26	Gold	MRZ-2b$^{(h-1)}$	71
14	Horseshoe Mine	14S 37E 26	Gold, Silver, Copper	MRZ-2b$^{(h-1)}$	71
15	Beveridge Canyon MN No. 28 Prospect	14S 37E 28	Gold	MRZ-2b$^{(h-1)}$	72
16	Bluebird Prospect	14S 37E 27	Gold, Copper	MRZ-2b$^{(h-1)}$	72

MINE #	MINE NAME	LOCATION	COMMODITIES	MRZ	PAGE
217	Prospect No. 29	14S 37E 27	Gold	MRZ-2b$^{(h-1)}$	7
218	Panamint View Mine	14S 37E 22	Gold, Silver, Lead	MRZ-2b$^{(h-1)}$	7
219	Highland Chief Mine	14S 37E 23	Gold	MRZ-2b$^{(h-1)}$	7
220	Keynot No. 30 Prospect	14S 37E 22	Gold, Silver, Copper	MRZ-2b$^{(h-1)}$	7
221	Keynote (Keynot) Mine	14S 37E 15, 22	Gold, Silver, Copper	MRZ-2b$^{(h-1)}$	7
222	Chambers Mine	14S 37E 23	Gold, Silver	MRZ-2b$^{(h-1)}$	7
223	No. 32 Mine	14S 37E 23		MRZ-2b$^{(h-1)}$	7
224	Beveridge Canyon MN No. 12 Mine	14S 37E 23	Gold	MRZ-2b$^{(h-1)}$	7
225	Beveridge Mine	14S 37E 23	Gold, Silver	MRZ-2b$^{(h-1)}$	7
226	Prospect No. 49	14S 37E 24	Gold	MRZ-2b$^{(h-1)}$	7
227	Mano Del Hombre Mine	14S 37E 24	Gold	MRZ-2b$^{(h-1)}$	7
228	Prospect No. 44	14S 37E 24	Gold, Silver	MRZ-2b$^{(h-1)}$	7
229	Prospect No. 43	14S 37E 24	Silver, Gold	MRZ-2b$^{(h-1)}$	7
230	Silver Ridge No. 3 Prospect	14S 38E 18		MRZ-2b$^{(h-1)}$	7
231	Silver Ridge No. 2 Mine	14S 38E 18	Silver, Gold, Lead, Zinc	MRZ-2b$^{(h-1)}$	7
232	Sal Prospect	14S 38E 18	Gold, Silver	MRZ-2b$^{(h-1)}$	7
233	No. 35 Mine	14S 37E 13	Gold, Silver, Copper	MRZ-2b$^{(h-1)}$	7
234	Red Dog Mine	14S 37E 12	Gold	MRZ-2b$^{(h-1)}$	7
235	Sweitzer Mine	14S 37E 11	Silver	MRZ-2b$^{(h-1)}$	7
236	Cinnamon Mine	14S 37E 11	Silver, Gold	MRZ-2b$^{(h-1)}$	7
237	Hacked Pinyon Prospect	14S 37E 10	Gold	MRZ-2b$^{(h-1)}$	7
238	Red Roof Mine	14S 37E 10	Gold, Silver, Copper, Lead	MRZ-2b$^{(h-1)}$	7
239	No.18 Mine	14S 37E 10	Gold	MRZ-2b$^{(h-1)}$	7
240	Blueledge Mine	14S 37E 10	Gold, Silver	MRZ-2b$^{(h-1)}$	7
241	Crystal Mine	14S 37E 10	Gold	MRZ-2b$^{(h-1)}$	7
242	Gold Bug Mine	14S 37E 10	Gold	MRZ-2b$^{(h-1)}$	7
243	Taylor-McElvoy Mine Area	14S 38E 3	Gold, Silver	MRZ-2b$^{(h-1)}$	7
244	Prospect No. 20	14S 37E 10	Gold	MRZ-2b$^{(h-1)}$	7
245	Laura Mine	14S 37E 2	Gold, Silver	MRZ-2b$^{(h-1)}$	7
246	Prospect No. 12	14S 37E 3	Gold	MRZ-2b$^{(h-1)}$	7
247	Johny Mine	14S 37E 3	Gold, Silver	MRZ-2b$^{(h-1)}$	8
248	Prospect No. 10	14S 37E 4	Gold	MRZ-2b$^{(h-1)}$	8
249	Pat Keyes Arrastres	14S 37E 5	Gold	MRZ-2b$^{(h-1)}$	8
250	Keys Mine	13S 37E 33	Gold, Silver	MRZ-2b$^{(h-1)}$	8
251	Cougar Mine	13S 37E 32	Gold	MRZ-2b$^{(h-1)}$	8
252	Prospect No. 5	13S 37E 32	Gold	MRZ-2b$^{(h-1)}$	8
253	Prospect No. 4	13S 37E 32	Gold	MRZ-2b$^{(h-1)}$	8
254	Hope Mine	14S 37E 17	Lead, Zinc, Silver, Gold	MRZ-2b$^{(h-1)}$	8
255	Joy and Vega Prospect	14S 38E 28	Gold, Silver, Copper	MRZ-2b$^{(h-1)}$	8
256	Morning Sun Prospect	15S 38E 3	Silver, Copper, Lead, Zinc	MRZ-2b$^{(h-1)}$	8
257	Silver Harvest Prospect	14S 38E 33	Silver	MRZ-2b$^{(h-1)}$	8
258	Mano Del Hombre Segundo Mine	14S 37E 24	Gold, Silver	MRZ-2b$^{(h-1)}$	8
259	New Argonaut Prospect	13S 37E 25	Silver, Gold	MRZ-2b$^{(h-1)}$	8
260	No. 50 Mine	14S 37E 23	Gold	MRZ-2b$^{(h-1)}$	8
261	Prospect No. 34	14S 37E 23	Gold	MRZ-2b$^{(h-1)}$	8
262	Prospect No. 40	14S 38E 18	Silver, Gold	MRZ-2b$^{(h-1)}$	8

MINE #	MINE NAME	LOCATION	COMMODITIES	MRZ	PAGE #
23	Prospect No. 45	14S 37E 24	Gold	MRZ-2b$^{(h-1)}$	83
24	Silver Ridge No. 1 Prospect	14S 38E 18	Silver, Copper, Lead	MRZ-2b$^{(h-1)}$	83
25	Valley View Prospect	14S 37E 34	Silver, Gold	MRZ-2b$^{(h-1)}$	84
26	Auguste Mine	16S 38E 2	Gold	MRZ-2b$^{(h-1)}$	84
27	Florence Talc Mine	16S 38E 1	Talc	MRZ-2b$^{(Talc-4)}$	131
28	Bonham (White Mountain Talc Mine)	15S 38E 35	Talc	MRZ-2b$^{(Talc-4)}$	131
29	Cerro Gordo Spring	16S 38E 3		MRZ-2b$^{(h-1)}$	84
30	Indian Prospect	13S 40E 32	Silver, Lead, Tungsten	MRZ-3a$^{(s-8)}$	125
31	Mary V	14S 40E 5	Copper	MRZ-3a$^{(s-8)}$	125
32	Holiday Talc	16S 38E 1	Talc	MRZ-2b$^{(Talc-4)}$	131
33	Cerro Gordo-Belshaw-Estalle	16S 38E 13	Lead, Silver, Zinc, Gold, Copper	MRZ-2b$^{(h-2)}$	85

APPENDIX A

MINES AND PROSPECTS OF THE EUREKA-SALINE VALLEY SMARA STUDY AREA

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Eastern Inyo Mountain Area, MRZ-2b(h-1)							
165	Big Silver	14S	38E	34 SW 1/4	Silver	The mine consists of six adits and a total of 2,800 ft. of tunnel along with two wireline trams, one of which is over 1,500 ft. in length. The adits explore a silver-bearing quartz vein in the irregular contact zone between dolomitic limestone and quartz monzonite. The vein strikes N65°E to N85°W and dips 55° to 70° south and has been cut into five segments by faults and dikes. The vein segments range from 1 to 12 ft. in thickness and have an exposed length of 700 ft. Mineralization consists of quartz and quartz breccia with galena, sphalerite, chalcopyrite, chrysocolla, malachite, sericite, hematite after pyrite, hematite, limonite, and possible tetrahedrite. Argentite (silver sulfide) and native silver are reported from the Big Silver Mine (Tucker, 1926). It is estimated that 800 tons of ore containing at least 7,600 oz. of silver have been mined. About 57,000 tons of vein material average 9.5 oz. silver per ton based on twenty-three chip samples is inferred (Close, 1985).	Close, 1985, p. 43-44; Tucker, 1926, p. 477-478
196	American Prospect	15S	39E	30	Silver	A 1.5 to 4.2 ft-thick vein of leached and oxidized quartz and calcite is in limestone and argillite. The vein contains galena, sphalerite, limonite, and malachite. It strikes N5°E, dips 50° to 77°NW, and can be traced for 1,700 ft. Two adits totaling 140 ft., and six prospect pits. About 390,000 tons of vein material averaging 0.07 oz. silver per ton, 0.2 percent copper, 0.8 percent lead, and 0.03 percent zinc are inferred, based on twenty-five chip samples.	Close, 1985, p. 71
197	American Flag Mine	15S	38E	9	Gold, Silver, Copper	Three vein segments of drusy quartz strike N50° to 70°W and dip 15° to 45°SW. The veins cut syenitic and granitic rocks and are traceable for 500 ft. along strike and 400 ft. downdip. The veins are 0.4 to 5.0 ft-thick, as long as 116 ft. and contain limonite, malachite, pyrite, chalcopyrite, galena, sphalerite, and gold. There are six underground workings totaling 720 ft., three benches totaling 100 ft., and several small pits. Production is estimated to have been 400 tons of ore containing at least 200 oz. of gold and 500 oz. of silver. Most ore was treated at the Craig Canyon mill 3 miles north of the mine. About 790 tons averaging 0.49 oz. gold per ton, 1.31 oz. silver per ton and 1.4 percent copper are inferred in the three vein segments, based on twenty-seven samples. These vein segments average 1.1 ft-thick.	Close, 1985, p. 71

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
198	Prospect 77	15S	38E	9	Silver, Gold, Copper, Lead	No mineralized structure is exposed. Dump material and working alignments suggest a quartz vein trends northwest in granitic rock near it contact with calcareous sedimentary beds. Quartz on the dumps contains malachite, chalcopyrite, galena, and tetrahedrite. Over a distance of 80 ft. are two small pits and a 40 ft. caved adit. Two samples of quartz from dumps contained 0.635 and 1.006 oz. gold per ton, 10.53 and 7.1 oz. silver per ton, 2.98 percent and 1.9 percent copper, and 6.26 percent and 1.95 percent lead. Silver-gold-copper-lead resources could be disclosed by subsurface exploration.	Close, 1985, p. 83
199	Trapier Mine	15S	38E	9	Gold, Silver, Lead	A 0.3 to 1.3 ft-thick vein follows a quartz monzonite-quartz diorite contact. The vein strikes N30° to 40°W, dips 40° to 70°NE, and is mainly quartz with galena. High grade material has mostly been mined. The remaining vein material is low grade and erratically mineralized. A glory hole, two adits connected by stopes, and a caved adit all totaling 200 ft. It is estimated that about 200 tons containing, at best, 500 oz. of gold, 3,000 oz. of silver, and 5 tons of lead have been mined. Four chip samples were taken across the vein. One sample from a stope assayed 7.91 oz. gold per ton, 17.8 oz. silver per ton, and 3.81 percent lead. The other three chip samples contained no significant metal values.	Close, 1985, p. 86
200	Prospect No. 78	15S	38E	16	Gold	A breccia zone in a basalt flow strikes N10° to 20°W and and dips 10° to 20°SW. It is exposed for 300 ft. along strike and is composed of limonitic, basalt-breccia cemented by quartz and calcite. Two chip samples had a trace gold. The zone is on the trend of the Beveridge gold vein system. The brecciation and gold detected may indicate that the system is present at depth.	Close, 1985, p. 83
201	Craig Canyon	15S	38E	7	Gold, Silver, Copper	The mill was built in the 1880's to process ore from the American Flag Mine. It consists of a partially dismantled stamp mill powered by a pelton wheel. The four 100 lb. stamps had the capacity to crush 5 tons of ore/day. About 400 tons of tailings contain 0.17 oz. gold per ton, 2.2 oz. silver per ton, and 2.7 percent copper. The site is a likely water source.	Close, 1985, p. 75

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
202	Hunter Arrastras	14S	38E	31	Gold, Silver, Copper, Lead	These arrastras were built in 1877 and treated ore from the Bighorn Mine until the 1930's. They are near Hunter Spring, a likely source of water. Three 12 ft. diameter arrastras, driven by a 12-horsepower steam engine. All are partially dismantled. Five tons of ore were treated per day. Tucker and Sampson (1938, p. 383) reported that $8,000 to $10,000 in gold (about 640 oz.) was recovered. About 1,000 tons of tailings remain at the site. A grab sample assayed 0.17 oz. gold per ton, 1.4 oz. silver per ton, 0.26 percent copper, and 0.19 percent lead.	Close, 1985, p. 77
203	Loadstar Prospect	15S	38E	6	Copper	Along a fractured contact zone between syenite and limestone is a 1 to 2 ft-thick, 115 ft. long quartz vein containing pyrrhotite, and pyrite. One 40 ft. bench, three pits, and a 4.5 mile long bulldozer road. Three chip samples had as much as 0.05 percent copper; they averaged 0.26 percent.	Close, 1985, p. 79
204	Gold Standard Mine	14S	38E	32	Silver, Gold, Copper	A poorly exposed vein system occurs along the northwest-trending, southwest-dipping, fractured contact zone between quartz monzonite and argillaceous limestone. Veins are 0.2 to 4.0 ft-thick and are mainly drusy quartz with limestone, galena, pyrite, and tetrahedrite. The principal vein averages 1.7 ft-thick and is 2,500 ft. long. Along the vein system are several small pits and open cuts, two benches totaling 150 ft. and four adits totaling 500 ft. It is estimated that 200 tons of ore were mined containing at least 600 oz. of gold, 12,000 oz. of silver, and 4,000 lb. copper. The vein system is estimated to contain 440,000 tons of material averaging 1.7 oz. silver per ton, 0.01 oz. gold per ton, and 0.28 percent copper, based on eleven chip samples.	Close, 1985, p. 76
205	Spring Mine	14S	38E	29	Gold	The mineralized structure has been mined. Working alignments and mineralized rock on the dumps indicate it was an east-trending, 20° to 30°SW dipping vein in metavolcanic and calcareous metasedimentary rock intruded by quartz monzonite. The vein was mainly limonite and malachite-stained quartz. Over a distance of 500 ft. are three adits totaling 400 ft., and several pits and open cuts. It is estimated that 500 tons of ore containing 100 oz. of gold were mined. Fourteen samples were taken; twelve were chip samples from adits, and two were grab samples of quartz from dumps. A 4 ft. chip sample across a limonitic fracture zone contained 0.554 oz. gold per ton. One grab sample had 0.07 oz. gold per ton and 0.5 percent copper. All the other samples were	Close, 1985, p. 85

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
206	Prospect No. 62	14S	38E	30	Gold	A vein strikes N5° to 10°W and dips 40° to 50°NE in quartz monzonite. The 400 ft. long, 0.9 to 3.8 ft-thick vein exposure is composed of drusy quartz with malachite, limonite, galena, and chalcopyrite. Only a 250 ft. long, 1.9 ft-thick portion contains significant metal values. Four pits. The gold-bearing portion of the vein is inferred to contain about 5,000 tons of material averaging 0.09 oz. gold per ton and 0.84 oz. silver per ton, based on three chip samples. The vein contains high grade portions and possibly, at depth, has gold resources.	Close, 1985, p. 83
207	Bighorn Mine Area	14S	37E	36	Gold, Silver, Copper, Lead	Three subparallel, drusy quartz veins in quartz monzonite are 0.1 to 8.5 ft-thick, as long as 3,500 ft., strike N80°E and dip 25° to 85°NW. The veins total about 4,000 ft. in length and average 2.4 ft-thick. A northwest-trending, gently dipping, poorly exposed vein crosscuts the three subparallel veins. The copper-stained veins have limonite, hematite boxwork, pyrite, chalcopyrite, galena, and gold. In an area that measures 2,000 ft. by 6,000 ft. are fifteen underground workings, eight benches, many small pits, a water line, and a small, dismantled cyanide mill. The principal mill (Hunter Arrastras) is 1.5 miles south. The underground workings total 3,000 ft. and the benches 2,000 ft. Tucker (1926, p. 466) reported that $40,000 in gold, with some silver, copper, and lead was produced. About 4,000 tons of ore containing at least 1,600 oz. of gold and 9,600 oz. of silver are estimated to have been mined. There are 1.2 million tons of inferred resources in the three subparallel veins averaging 0.39 oz. gold per ton, 2.4 oz. silver per ton, and 0.04 percent copper based on seventy-seven chip samples.	Close, 1985, p. 29-31, 73
208	Llano Del Oro Prospect	14S	37E	36	Copper	A poorly exposed, 2 to 4 ft-thick, malachite-stained breccia zone, cemented by quartz, strikes N70° to 80°E and dips 75°SE in quartz diorite. A 90 ft. caved adit. One chip sample contained 0.7 percent copper.	Close, 1985, p. 79

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
209	Gavalan Mine Area	14S	37E	36	Gold	Poorly exposed, irregular, quartz veins as thick as 13 ft. are along a zone of east-trending, steeply dipping fractures in quartz monzonite. The veins contain malachite and limonite boxwork after pyrite and galena. The principal vein averages 2.9 ft-thick and is 520 ft. long. Over a distance of 1,700 ft. along the zone are seven pits, and three adits totaling 150 ft. Crawford (1894, p. 137) reported that a vein 5 ft-thick, 100 ft. wide, and 200 ft. long (8,000 tons of ore) had been mined. It is estimated that this ore contained at least 3,400 oz. of gold. The principal vein contains about 33,000 tons of inferred resources averaging 0.42 oz. gold per ton, based on nine chip samples.	Close, 1985, p. 36-37, 76
210	Burgess Mine Area	15S	37E	13	Silver, Lead, Zinc, Gold	Poorly exposed, irregular, and randomly oriented quartz veins and skarn zones are in limestone and volcanic rocks, which have been metamorphosed by the intrusion of quartz monzonite and andesitic dikes. The veins are composed of quartz and calcite with limonite, manganese oxide, and sparse galena, tetrahedrite, sphalerite, cerussite, malachite, smithsonite, and azurite. The skarn zones are composed of garnet, epidote, actinolite, diopside, and sparse sphalerite. The skarns are leached and oxidized and occur mainly in volcanic rocks, although they may be found in the limestone. In an area that measures 6,400 by 6,200 ft., are sixty-four pits, twelve trenches, and twenty-eight underground workings totaling about 4,000 ft. In 1910, 46 tons of ore containing 22 oz. of gold and 11 oz. silver were shipped. A total of one hundred-fifteen samples were taken. The grab samples contained as much as 0.64 oz. gold per ton, 16.9 oz. silver per ton, 1.28 percent copper, 4.1 percent lead, and 3.1 percent zinc. Chip samples with significant values were from widely scattered, isolated occurrences. Of the seventy-four chip samples taken, twenty had significant gold, sixty-one silver, forty-three copper, forty lead, and forty-one zinc. The principal commodity in most chip samples was silver.	Close, 1985, p. 74
211	Prospect No. 72	15S	37E	12	Silver, Gold, Copper	A sheared and limonite-stained contact zone between an andesite dike and limestone is exposed in a roadcut. The zone is 2.6 thick, strikes N25°W, dips 84°NE, and contains quartz and malachite. A chip sample across the exposure contained trace gold, 0.6 oz. silver per ton, and 0.61 percent copper. Subsurface exploration could disclose gold-silver-copper resources.	Close, 1985, p. 83

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
212	Beveridge Canyon MN No. 26 Prospect	14S	37E	35	Gold	The owner reports a sulfide-bearing quartz vein about 1.0 ft-thick that trends northwest and dips 15° to 20°W and is in quartz monzonite.	Close, 1985, p. 72
213	Beveridge Canyon Mine Prospect	14S	37E	23	Gold	Two veins in quartz monzonite, and a placer, are present. The principal vein, mainly gouge and quartz with limonite, malachite, and pyrite, is 1,700 ft. long and 0.3 to 3.0 ft-thick, strikes N20° to 80°E, and dips 10° to 35°NW. The other vein is mainly quartz with limonitic arsenopyrite and pyrite, is 3 to 10 ft-thick and 250 ft. long, strikes N15° to 20°W, and dips 75° to 85°NE. The placer is composed of angular, partially-indurated alluvium in a gulch 4,400 ft. long. Lode workings include five adits totaling 200 ft., and five small pits. A few pits and trenches comprise the placer workings. A 400 ft. long, 2.6 ft-thick part of the principal vein contains 17,000 tons of vein material inferred to 0.04 oz. gold per ton, based on three chip samples. Chip samples taken by the owner averaged 0.6 oz. gold per ton. Samples from the second vein contained no significant metal values.	Close, 1985, p. 72
214	Horseshoe Mine	14S	37E	26	Gold, Silver, Copper	Gold-bearing veins occur along northwest-trending, southwest-dipping fractures in quartz monzonite. Vein exposures are as thick as 3.0 ft., as long as 800 ft., and are composed of oxidized, limonitic, copper-stained, drusy quartz vein pyrite and chalcopyrite. The veins occur in a zone that is 500 ft. wide. Eight vein exposures average 1.3 ft-thick and have a total length of 2,600 ft. Over a distance of 2,200 ft. along the zone are twenty-nine adits totaling 1,200 ft., eleven benches totaling 2,100 ft., a number of small pits and cuts, and a dismantled two stamp mill. Production is estimated to have totaled 2,000 tons of ore containing at least 200 oz. of gold. About 81,000 tons of vein material average 0.08 oz. gold per ton, based on sixty-seven chip samples. Sixty of the sixty-seven chip samples were from across veins and had gold. Grab samples assayed as much as 2.67 oz. gold per ton, 4.6 oz. silver per ton, and 1.51 percent copper. Sampling suggests higher grade vein material and gold resources probably would be disclosed by subsurface exploration.	Close, 1985, p. 77

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
215	Beveridge Canyon Mine No. 28 Prospect	14S	37E	28	Gold	The claimant reports a 1.5 ft-thick quartz vein along the northwest trending, vertical contact zone between a dike and metasedimentary rock. The owner reports an assay of 1.46 oz. gold per ton.	Close, 1985, p. 72
216	Bluebird Prospect	14S	37E	27	Gold, Copper	A 2.2 to 3.0 ft-thick vein in quartz monzonite strikes N65° to 75°W, dips 30° to 65°SW, averages 2.7 ft-thick, and is 770 ft. long. The vein is composed of drusy quartz with pyrite and malachite. Four adits totaling 230 ft., and one prospect pit. The vein is inferred to contain 67,000 tons of material averaging 0.02 oz. gold per ton, based on three chip samples. Grab samples contained as much as 0.234 oz. gold per ton and 3.5 percent copper.	
217	Prospect No. 29	14S	37E	27	Gold	No mineralized structure is exposed. Dump material and working alignments indicate a northwest-trending, northeast-dipping, limonitic, pyritic quartz vein at least 0.5 ft-thick in quartz monzonite. Two pits 70 ft. apart. Two grab samples were taken. One of stockpiled quartz assayed 0.092 oz. gold per ton. The other of quartz and wallrock had 0.036 oz. gold per ton.	Close, 1985, p. 82
218	Panament View Mine	14S	37E	22	Gold, Silver, Lead	A vein, 1.5 to 2.0 ft-thick, composed of drusy quartz with pyrite, galena, and malachite, strikes N30°W and dips 20° to 30°SW in quartz diorite. It averages 1.8 ft-thick and developed for 80 ft. One 80 ft. bench and four underground workings totaling 100 ft. It is estimated that 120 tons of ore containing at least 10 oz. of gold and 200 oz. of silver were mined. The vein is inferred to contain 480 tons of material averaging 0.12 oz. gold per ton, 1.8 oz. silver per ton, 0.09 percent copper and 0.89 percent lead, based on two chip samples.	Close, 1985, p. 81
219	Highland Chief Mine	14S	37E	10	Gold	A drusy quartz vein with limonite and pyrite is in quartz monzonite. The vein strikes N70°W, dips 60°NE, and is 0.7 to 3.0 ft-thick. There are two adits totaling 120 ft., 180 ft. apart. A pit lies between them. Two chip samples were taken. One assayed 0.02 oz. gold per ton and the other contained no significant metal values.	Close, 1985, p. 76

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
220	Keynot No. 30 Prospect	14S	37E	22	Gold, Silver, Copper	No mineralized structure is exposed. Working alignments and dump material indicate a 1.0 ft-thick vein strikes N80°W and dips 55°SW in quartz monzonite. The vein is mainly drusy quartz with limonite, pyrite, malachite, chalcopyrite, and gold. Over a distance of 190 ft. along the vein are a 100 ft. bench and 90 ft. caved adit. Eighty feet south is an arrastre. It is estimated that 600 tons of ore containing at least 200 oz. of gold were mined. Five grab samples contained 0.06 to 0.802 oz. gold per ton, as much as 0.7 oz. silver per ton, and 0.39 percent copper.	Close, 1985, p. 78
221	Keynote (Keynot) Mine	14S	37E	15, 22	Gold, Silver, Copper	Three nearly parallel veins, about 350 ft. apart and a subparallel vein are in quartz monzonite. The four veins identified have lengths totaling about 9,700 ft. The parallel veins are 0.3 to 5.0 ft-thick, strike N40° to 70°W, and dip 25° to 55°SW. Near the surface they are primarily leached, drusy quartz with gold. At depth gold is associated with chalcopyrite, pyrite, and galena. Most of the near surface veins have been mined and the workings backfilled. The subparallel vein is 0.5 to 4.0 ft-thick, strikes N50° to 70°W, dips 25° to 35°SE, and has slightly more galena. The principal working has 8,000 ft. of levels, sublevels, and raises. In addition, there are another twenty-seven smaller underground workings totaling about 2,100 ft., and numerous small pits and cuts. A 250-ton/day cyanide mill is near the principal workings. Laskey's stamp mill, where most Keynote ore was processed, is 3 miles south. Production records and working sizes indicate that between 1878 and 1906 about 5,000 tons of hand-sorted, gold-bearing quartz were transported to the mill where about 29,000 oz. of gold were recovered. The four veins contain about 2.5 million tons of inferred resources averaging 0.17 oz. of gold, based on one hundred-eighty-nine chip samples. A 100,000 ton part of the vein located in the principal workings average 0.43 oz. gold per ton, 0.56 oz. silver per ton; and 0.21 oz. gold per ton and 0.53 oz. silver per ton for 47,000 tons of dump material.	Close, 1985, p. 26-28, 78; Burchard, 1883, p. 159; USGS Bulletin 540, p. 112; USGS Professional Paper 110, p. 118; Division of Mines and Geology State Mineralogist Reports XII, p. 138; XIII, p. 181; XV, p. 81; XXII, p. 470

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
222	Chambers Mine	14S	37E	23	Gold, Silver	Two veins in quartz monzonite strike N30° to N90°W and dip 20° to 30°SW. The better exposed is 0.1 to 3.0 ft-thick, 1,000 ft. long, and is composed of drusy quartz with malachite, limonite pyrite, galena, and chalcopyrite. The second 200 ft. below, is indicated by dump material of similar composition. Over a distance of 1,200 ft. are twelve pits and trenches, four benches totaling 260 ft., five adits totaling 1,000 ft., and an arrastre. It is estimated that 300 tons of ore with at least 48 oz. of gold and 87 oz. of silver were mined. Inferred in three vein segments totaling 530 ft. in length and averaging 0.8 ft-thick are 4,000 tons of material averaging 0.16 oz. gold per ton and 0.29 oz. silver per ton, based on nine chip samples.	Close, 1985, p. 74
223	No. 32 Mine	14S	37E	23	Gold	A vein of limonitic, drusy quartz, with pyrite and malachite in monzonite, strikes N40° to 50°W, dips 25° to 35°NE, and is 0.3 to 1.5 ft-thick. It averages 0.8 ft-thick and 220 ft. long. Two declines totaling 190 ft. and three prospect pits. It is estimated that 200 tons of ore containing 40 oz. of gold were mined. The vein is inferred to contain 1,600 tons of material averaging 0.2 oz. gold per ton, based on three chip samples.	Close, 1985, p. 80
224	Beveridge Canyon Mine No. 12	14S	37E	23	Gold	A 0.5 to 3.5-thick drusy quartz vein in quartz monzonite strikes N30° to 50°W, dips 15° to 35°NE, and is 1,600 ft. long. The vein contains pyrite, malachite, chalcopyrite, and gold. Six adits totaling 650 ft., a 180 ft. bench, an ore bin, and a wireline tram to Laskey's mill, 0.3 mile away. Production estimate totals about 1,000 tons of ore containing at least 200 oz. of gold. Of the twenty-eight chip samples taken, twelve contained gold. Two had more than 0.1 oz. per ton. The parts of the vein with gold are too scattered to estimate size and grade.	Close, 1985, p. 72
225	Beveridge Mine	14S	37E	23	Gold, Silver	A 1 to 8 ft-thick drusy quartz vein in quartz monzonite, with an average thickness of 2.1 ft. strikes N30°E, dips 35°NW, and is 1,500 ft. long. The vein contains pyrite, limonite, malachite, chalcopyrite, and gold. Along the vein are eleven underground workings totaling 700 ft., four benches totaling 400 ft., several small pits, a wireline tram, and a Huntington mill. Estimated production is 1,000 tons of ore containing at least 300 oz. of gold and 1,000 of silver. About 200,000 tons of inferred resources average 0.3 oz. gold per ton and 1.1 oz. silver per ton, based on thirty-three chip samples.	Close, 1985, p. 34-35, 72

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
226	Prospect No. 49	14S	37E	24	Gold	In quartz monzonite, a poorly exposed, 2.1 ft-thick vein strikes N20° to 40°E and dips 10° to 20°SE. The vein contains pyrite and limonite. One small pit. A chip sample across the vein assayed 0.13 oz. gold per ton. Gold resources could be disclosed by exploration.	Close, 1985, p. 83
227	Mano Del Hombre Mine	14S	37E	24	Gold	A 0.7 to 4.7 ft-thick vein strikes northerly and dips 10° to 30°W in quartz monzonite. The vein is mainly drusy quartz with limonite, pyrite, malachite, chalcopyrite, and gold. The exposure averages 1.4 ft-thick and is 290 ft. long. A 90 ft. bench, 40 ft. adit, and ore pit. It is estimated that 100 tons of ore with at least 30 oz. of gold were mined. The vein is inferred to contain 4,900 tons of material averaging 0.29 oz. gold per ton, based on five chip samples.	Close, 1985, p. 79
228	Prospect No. 44	14S	37E	24	Gold, Silver	A 0.7 ft-thick quartz vein strikes N50°W and dips 30° NE in quartz diorite. The limonitic, pyritic vein is exposed in only one place but can be traced for at least 90 ft. One 30 ft. decline and two small pits. A chip sample across the vein assayed 0.154 oz. gold per ton and 1.3 oz. silver per ton.	Close, 1985, p. 83
229	Prospect No. 43	14S	37E	24	Silver, Gold	A poorly exposed, 2 to 5 ft-thick silicified zone containing limonite and chalcopyrite strikes N40°W and dips 35°SW in quartz monzonite. Over a distance of 40 ft. along the zone are four small pits and a 60 ft. adit. Three samples were taken. One of two chip samples across the zone had 0.024 oz. gold per ton; the other contained no significant metal values. A grab sample from the adit dump had 1.9 percent copper.	Close, 1985, p. 82
230	Silver Ridge No. 3 Prospect	14S	38E	18		A 2 ft-thick, 200 ft. long, limonite-stained zone occurs in quartzite. None. Two chip samples across the zone were barren.	Close, 1985, p. 85
231	Silver Ridge No. 2 Mine	14S	38E	18	Silver, Gold, Lead, Zinc	A 2.0 to 3.5 ft-thick lens is composed of quartz and calcite, with galena, tetrahedrite, and argentite. It is almost 50 ft. long, strikes N40° to 45°W and dips steeply across limestone beds intruded by quartz diorite. The lens is almost mined out. One 45 ft. open stope from which 90 tons of ore containing at least 8 oz. of gold, 180 oz. of silver, and 2,900 lb. of lead were mined. There are about 100 tons remaining which average 0.08 oz. gold per ton, 2.1 oz. silver per ton, 1.6 percent lead, and 0.4 percent zinc, based on four chip samples.	Close, 1985, p. 85

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
232	Sal Prospect	14S	38E	18	Gold, Silver	A small skarn zone and a few randomly oriented, 2.0 to 5.0 ft-thick fracture zones that contain limonite- and malachite-stained quartz are along a contact zone between limestone and quartz monzonite. One 170 ft. adit and four pits. Nine samples from the skarn zone were barren. Three chip samples across fracture zones contained as much as 0.07 oz. gold per ton and 0.19 percent copper. A grab sample of quartz from a dump contained 0.19 percent copper.	Close, 1985, p. 84
233	No. 35 Mine	14S	37E	13	Gold, Silver, Copper	Two parallel veins 100 ft. apart, strike N40°W and dip 10° to 20°SW in quartz monzonite. The 0.4 to 4.0 ft-thick veins are composed of drusy quartz with limonite, malachite, pyrite, and chalcopyrite. The upper vein averages 0.7 ft-thick and is developed for 650 ft. Two benches totaling 155 ft., two adits totaling 85 ft., two declines totaling 75 ft., and several small pits and cuts. It is estimated that 200 tons of ore containing at least 20 oz. of gold and 300 oz. of silver were mined. The upper vein is inferred to contain about 12,000 tons of material averaging 0.13 oz. gold per ton, 1.3 oz. silver per ton, and 0.23 percent copper, based on seven chip samples. The lower vein averages a trace gold, 0.03 oz. silver per ton, and 0.2 percent copper.	Close, 1985, p. 81
234	Red Dog Mine	14S	37E	12	Gold	An irregular, branching vein strikes N20° to 40°W, dips 10° to 40°SW, and is exposed intermittently for over 2,500 ft. in quartz monzonite. The 0.5 to 10.0 ft-thick quartz vein is mainly drusy quartz with limonite, malachite, pyrite, and gold. Scattered for 1,500 ft. along the vein are six underground workings totaling 500 ft., three benches totaling 150 ft., and a number of small pits and open cuts. It is estimated that 600 tons of ore containing at least 50 oz. of gold were mined. Three segments of the vein, totaling 480 ft. and averaging 2.2 ft-thick, are inferred to contain 6,800 tons of material averaging 0.09 oz. gold per ton and 0.12 oz. silver per ton, based on twenty-six chip samples. Additional vein material and gold resources are likely.	Close, 1985, p. 84

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
235	Sweitzer Mine	14S	37E	11	Silver	A 1.7 to 3.2 ft-thick, 930 ft. long branching vein strikes N10° to 25°E and dips 50° to 80°NE in quartz diorite. The vein material is mainly quartz with limonite, malachite, azurite, and tetrahedrite. Silver-bearing vein segments total 115 ft. in length and average 1.7 ft-thick. A 450 ft. adit with stope to the surface, and several small pits and open cuts. It is estimated that 100 tons of ore containing at least 800 oz. of silver were mined. Identified are about 540 tons of vein material averaging 8.3 oz. silver per ton, based on seven chip samples.	Close, 1985, p. 86
236	Cinnamon Mine	14S	37E	11	Gold, Silver	A 1.9 ft-thick, 40 ft. long vein of gouge, and quartz with pyrite and malachite is in diorite. The vein strikes east and dips 10° to 35°S. A partially caved adit (with stope) is open for 65 ft. It is estimated that 60 tons of ore containing at least 16 oz. of gold and 50 oz. of silver were mined. The vein is inferred to contain 120 tons of material averaging 0.26 oz. gold per ton and 0.87 oz. silver per ton, based on two chip samples.	Close, 1985, p. 74
237	Hacked Pinyon Prospect	14S	37E	10	Gold	No mineralized structure is exposed. Dump material indicates a limonitic, drusy quartz vein in quartz monzonite. Over distance of 100 ft. along a bearing of N20°W are some small pits and two caved adits estimated to total 90 ft. A grab sample of quartz from the dumps assayed 0.01 oz. gold per ton.	Close, 1985, p. 76
238	Rock Roof Mine	14S	37E	10	Gold, Silver, Copper, Lead	A poorly exposed 1.1 to 4.0 ft-thick zone of limonite- and malachite-stained gouge, and quartz follows a contact between granite and greenstone that strikes N58°E and dips 32°NW. A 40 ft. caved adit and 100 ft. bench. It is estimated that 50 tons of ore containing at least 20 oz. of gold were mined. One of two chip samples across the zone assayed 0.03 oz. gold per ton; the second sample contained no significant metal values. Two grab samples of quartz from dumps had trace and 1.33 oz. gold per ton, 0.1 and 0.6 oz. silver per ton, 0.34 percent and 1.9 percent copper, and trace and 0.16 percent lead.	Close, 1985, p. 84

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
239	No. 18 Mine	14S	37E	10	Gold	A 0.3 to 1.1 ft-thick vein strikes east and dips 30° to 35°S in quartz monzonite. The vein averages 0.6 ft-thick, is 60 ft. long, and is mainly drusy quartz with malachite, limonite, and pyrite. A 55 ft. adit with stope, and a 65 ft. bench. It is estimated that 100 tons of ore containing at least 10 oz. of gold were mined. The vein has about 90 tons of material averaging 0.11 oz. gold per ton and 0.25 oz. silver per ton, based on six chip samples.	Close, 1985, p. 80
240	Blueledge Mine	14S	37E	10	Gold, Silver	A horizontal, drusy quartz vein 1.2 ft-thick and 80 ft. long in quartz monzonite contains limonite, malachite, and pyrite. On the vein are two adits totaling 90 ft., and a 95 ft. bench. It is estimated that 100 tons of ore containing at least 40 oz. of gold and 20 oz. of silver were mined. The vein is inferred to contain 320 tons of material averaging 0.43 oz. gold per ton and 0.21 oz. silver per ton, based on five chip samples.	Close, 1985, p. 73
241	Crystal Mine	14S	37E	10	Gold	A drusy quartz vein with pyrite strikes N80°W and dips 30° to 40°SW in quartz monzonite. The vein is 1 ft-thick and 80 ft. long. A 40 ft. adit, and 30 ft. bench with an underhand stope. An estimated 30 tons of ore containing at least 5 oz. of gold were mined. The vein is inferred to contain 340 tons of material averaging 0.18 oz. gold per ton, based on five chip samples.	Close, 1985, p. 75
242	Gold Bug Mine	14S	37E	10	Gold	A 0.5 to 3.5 ft-thick quartz vein with limonite, malachite, pyrite, and chalcopyrite strikes N5° to 25°W and dips 20° to 50°SW in monzonite. The vein can be traced for 200 ft. and averages 1.8 ft-thick. The mine is near McElvoy Creek, a likely source of water. Three underground workings totaling 100 ft., a 100 ft. bench, and three small pits. About 100 tons of ore containing at least 10 oz. of gold are estimated to have been mined. The vein is inferred to contain about 3,000 tons of material averaging 0.13 oz. gold per ton, based on nine chip samples.	Close, 1985, p. 76

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
243	Taylor-McElvoy Mine Area	14S	38E	3	Gold, Silver	Eight nearly parallel veins, 200 to 300 ft. apart, are along a fracture zone in quartz monzonite. The zone can be traced 3,600 ft. along its N20° to 40°W trend. The veins are 0.2 to 3.3 ft-thick and average 1.7 ft-thick. They are mainly drusy quartz with gold, malachite, limonite, hematite boxwork, pyrite, and chalcopyrite. Along the veins are twelve adits totaling about 2,200 ft., and nine benches totaling 1,300 ft. A dismantled stamp mill, arrastre, and steam engine are on McElvoy Creek below the workings. It is estimated that 800 tons of ore containing at least 200 oz. of gold and 200 oz. of silver were mined. The eight veins are inferred to contain 370,000 tons of resources averaging 0.24 oz. gold per ton and 0.23 oz. silver per ton, based on seventy-three chip samples. Additional gold-silver resources are likely.	Close, 1985, p. 32-33, 86
244	Prospect No. 20	14S	37E	10	Gold	Two parallel veins, 30 ft. apart, strike N60° to 70°W and dip 26° to 35°SW in quartz monzonite. Each vein is exposed for about 200 ft. They are 1.2 to 4.4 ft-thick and composed of drusy quartz with limonite, malachite, and pyrite. The upper vein 2 ft-thick. One 4 ft. adit. Samples from the upper vein averaged 0.02 oz. gold per ton, based on two chip samples. Samples from the lower vein contained no significant metallic values.	Close, 1985, p. 82
245	Laura Mine	14S	37E	2	Gold, Silver	Two parallel veins, 150 ft. apart, trend north and dip 25° to 45°W in unaltered diorite. The lower vein is 0.8 ft-thick and 980 ft. long; the upper is 1.4 ft-thick and 600 ft. long. Both veins are composed of limonitic quartz with pyrite and chalcopyrite. Two adits totaling 40 ft., three benches totaling 160 ft., and one pit. It is estimated that 300 tons of ore containing at least 30 oz. of gold were mined. The two veins are inferred to total 57,000 tons of material averaging 0.08 oz. gold per ton and 0.24 oz. silver per ton, based on sixteen chip samples.	Close, 1985, p. 79
246	Prospect No. 12	14S	37E	3	Gold	No mineralized structure is exposed. Working alignments and material on dumps suggest a 0.5 ft-thick quartz vein trends northwest in quartz monzonite. Over a distance of 100 ft. along trend are three benches totaling 90 ft. Grab samples of vein material as thick as 0.5 ft. from each of the dumps assayed 1.44, 0.20 and 0.05 oz. gold per ton.	Close, 1985, p. 82

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
247	Johny Mine	14S	37E	3	Gold, Silver	A 0.4 ft-thick quartz vein in quartz monzonite is exposed for 200 ft. The vein is malachite and limonite-stained, strikes northerly, and dips 25° to 45°W. A 75 ft. bench with a 6 ft. underhand stope, from which 100 tons of ore containing at least 80 oz. of gold are estimated to have been mined. About 670 tons of vein material averaging 0.8 oz. gold per ton are inferred. Three chip samples across the vein assayed 0.03, 1.70, and 1.74 oz. gold per ton. One sample also had 1.8 oz. silver per ton. Subsurface work would probably disclose gold resources.	Close, 1985, p. 77
248	Prospect No. 10	14S	37E	4	Gold	A 0.3 ft-thick, limonitic, drusy quartz vein with pyrite strikes N85°E and dips 45°SE in monzonite. One pit. A chip sample across the single exposure of this narrow vein assayed 0.05 oz. gold per ton and 0.02 oz. silver per ton.	Close, 1985, p. 82
249	Pat Keyes Arrastras	14S	37E	5	Gold	The arrastras were used to process ore from the Keys Mine. They are located on a permanent water source. One burro-powered and one steam-powered arrastre operated in the 1890's and 1930's. A small part of the tailing were placer mined in the 1970's. The remaining tailings total 100 tons and average 0.73 oz. gold per ton and 1.8 oz. silver per ton.	Close, 1985, p. 81
250	Keys Mine	13S	37E	33	Gold, Silver	A 0.1 to 2.3 ft-thick vein strikes N30° to 50°W and dips 15° to 65°NE in quartz monzonite. It is mainly leached, oxidized, drusy quartz with limonite, malachite, pyrite, chalcopyrite, and galena. The 1.2 ft-thick vein crops out intermittently for 1,200 ft. along dip and 150 ft. along strike on a ridgetop. Along the vein are eleven underground workings totaling 800 ft., three benches totaling 450 ft., and a number of small pits and open cuts. A small cyanide mill was located near an adit portal. The principal mill (Pat Keyes arrastras) is 1.5 miles south. It is estimated that 5,000 tons of ore containing at least 1,200 oz. of gold and 3,000 oz. of silver were mined. The vein is inferred to contain 18,000 tons of material averaging 0.25 oz. gold per ton and 0.61 oz. silver per ton, based on twenty-seven chip samples.	Close, 1985, p. 78

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
251	Cougar Mine	13S	37E	32	Gold	The principal vein consists of drusy quartz in quartz monzonite. The vein strikes N30° to 60°W, dips 15° to 25°SW and contains limonite, malachite, and pyrite. The vein averages 0.3 ft-thick and is exposed intermittently for 300 ft. A parallel vein of similar composition may occur about 100 ft. above the principal vein. Along the principal vein are four adits totaling 325 ft., and a 90 ft. bench. A prospect pit is on the second vein. It is estimated that 50 tons of ore containing at least 20 oz. of gold were mined. The principal vein contains about 1,100 tons of inferred material averaging 0.44 oz. gold per ton, based on fourteen chip samples.	Close, 1985, p. 75
252	Prospect No. 5	13S	37E	32	Gold	A limonitic quartz vein, 0.8 to 1.0 ft-thick, strikes N35° to 65°W and dips 25°SW in quartz monzonite. It averages 0.9 ft-thick and is explored for 70 ft. One 20 ft. adit and one pit 70 ft. to the northwest. The vein averages 0.05 oz. gold per ton, based on two chip samples.	Close, 1985, p. 81
253	Prospect No. 4	13S	37E	35	Gold	A 0.8 to 1.8 ft-thick drusy quartz vein with limonite strikes N80°W and dips 30°SW in monzonite. One 150 ft. bench. One of the two chip samples across the vein had 0.04 oz. gold per ton; the other contained no significant metal values.	Close, 1985, p. 81
254	Hope Mine	14S	37E	17	Lead, Zinc, Silver, Gold	Small metasomatic deposits occur in two dolomitic-marble roof pendants in quartz monzonite. In the west pendant, a zone of malachite-bearing garnet and pyroxene skarn is 1.7 ft-thick and 20 ft. long. About 650 ft. away, in the east pendant, is a 0.7 to 1.3 ft-thick quartz vein. The vein strikes N30°W, dips 30°SW, averages 1.0 ft-thick, is 50 ft. long, and contains galena and smithsonite. At the west pendant are a 24 ft. adit and small pit. At the east pendant are a 20 ft. adit and a 10 ft. shaft. It is estimated that 60 tons of ore containing 10 oz. of gold, 80 oz. of silver, 2,000 lb. of lead, and 3,000 lb. of zinc were mined from the vein. The vein exposure in the east pendant is estimated to contain about 100 tons of material averaging 0.2 oz. gold per ton, 1.3 oz. silver per ton, 1.8 percent lead, and 2.9 percent zinc, based on two chip samples.	Close, 1985, p. 76

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
255	Joy and Vega Prospect	14S	38E	28	Gold, Silver, Copper	Poorly exposed, jumbled, 0.1 to 1.0 ft-thick quartz-calcite veins containing malachite, pyrite, and chalcopyrite occur in a quartz monzonite slump block. Two adits totaling 55 ft., and a number of pits and trenches are in a 1.5 acre area. About 2,000 ft. north is a dismantled mill. Ten samples were taken. Grab samples of vein material from the dumps contained as much as 0.199 oz. gold per ton, 1.4 oz. silver per ton, and 0.24 percent copper. Six vein chip samples had minor gold, silver, and copper.	Close, 1985, p. 77
256	Morning Sun Prospect	15S	38E	3	Silver, Copper, Lead, Zinc	The prospect is on an extension of the Big Silver Mine deposits. A 0.9 to 2.1 ft-thick vein strikes N60° to 80°E and dips 85°NW. It averages 1.3 ft-thick and crops out intermittently for 900 ft. along a faulted contact zone between quartz monzonite and calcareous metasedimentary beds. The zone trends north and dips east. Vein material is leached and oxidized, and consists of drusy quartz with limonite, malachite, tetrahedrite, and sphalerite. A 115 ft. adit, one small pit, and a 1,550 ft. wireline tram. The vein contains about 44,000 tons of resources averaging 22 oz. silver per ton, 0.32 percent copper, 0.27 percent lead, and 0.76 percent zinc, based on six samples.	Close, 1985, p. 45, 80
257	Silver Harvest Prospect	14S	38E	33	Silver	Along a contact zone between quartz monzonite and argillaceous limestone in an 8 to 91 ft-thick fracture zone that trends northeast and dips steeply. The zone is visible for 1,800 ft. along strike and for 800 ft. downdip; but, because of cliffs, is accessible for only about 460 ft. The accessible part of the zone averages 20 ft-thick, and is leached and oxidized breccia and gouge with quartz and tetrahedrite. Two adits totaling 40 ft. and a pit. The accessible portion of the zone is inferred to contain 180,000 tons of material that average 2.6 oz. silver per ton, based on six chip samples.	Close, 1985, p. 41-42, 84
258	Mano Del Hombre Segundo Mine	14S	37E	24	Gold, Silver	A 0.5 to 3.0 ft-thick vein strikes N60°E and dips 10° to 60°NW in quartz monzonite. The vein is mainly drusy quartz with pyrite and limonite. Only a 280 ft. long portion of the vein, averaging 2.1 ft-thick, contains precious metals. Two pits, a 125 ft. bench, and three adits totaling 380 ft. are scattered over 400 ft. along the vein. It is estimated that 350 tons were mined containing at least 20 oz. of gold and 200 oz. of silver. The vein is inferred to contain 6,900 tons of material that average 0.06 oz. gold per ton and 0.54 oz. silver per ton, based on six chip samples.	Close, 1985, p. 80

MINE NO.	NAME	LOCATION T.	LOCATION R.	LOCATION SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
259	New Argonaut Prospect	13S	37E	25	Silver, Gold	A poorly exposed, 4 ft-thick quartz lens strikes N65°E and dips 70°NW in fractured quartz monzonite. Both lens and wallrock are limonite stained. One 5 ft. adit. Three samples were taken. One chip sample across the lens had a trace of gold and 0.07 oz. silver per ton. A wallrock sample contained 0.05 oz. silver per ton. A grab of quartz from the dump assayed trace gold and 0.09 oz. silver per ton. All of the samples had about 0.01 percent copper.	Close, 1985, p. 80
260	No. 50 Mine	14S	37E	23	Gold	A 0.5 ft-thick quartz vein with limonite, malachite, pyrite, and chalcopyrite strikes N30° to 40°W and dips 20° to 30°SW in quartz monzonite. Most of the vein has been mined and does not extend beyond the present working. One 30 ft. bench. It is estimated that 10 tons of ore containing at least 1 oz. of gold were removed. One chip sample contained 0.1 oz. gold per ton, 0.6 oz. silver per ton, and 0.46 percent copper.	Close, 1985, p. 81
261	Prospect No. 34	14S	37E	23	Gold	A poorly exposed, 0.8 ft-thick, horizontal, limonitic, drusy quartz vein is in quartz monzonite. One small pit. A chip sample across the vein contained 0.06 oz. gold per ton, 0.3 oz. silver per ton, and 0.02 percent lead.	Close, 1985, p. 82
262	Prospect No. 40	14S	38E	18	Silver, Gold	A poorly exposed, 3.0 ft-thick quartz vein is in dolomite intruded by quartz diorite. It follows bedding which strikes N50°E and dips 65°NW. The vein is exposed for 10 ft. and contains malachite and tetrahedrite. One small pit. A chip sample across the vein had 0.052 oz. gold per ton, 20.0 oz. silver per ton, 0.11 percent copper, 0.055 percent lead, and 0.027 percent zinc. Exploration would probably disclose silver-gold resources.	Close, 1985, p. 82
263	Prospect No. 45	14S	37E	24	Gold	A poorly exposed, 1.5 ft-thick, limonitic quartz vein strikes N40°W and dips 55°NE in quartz monzonite. One 30 ft. decline. A chip sample across the vein assayed 0.029 oz. gold per ton.	Close, 1985, p. 83
264	Silver Ridge No. 1 Prospect	14S	38E	18	Silver, Copper, Lead	A limonitic vein is in a quartz monzonite intrusion in limestone. The 0.7 to 3.5 ft-thick vein strikes east, dips 60° to 85°NE, and is mainly quartz and calcite, with galena, tetrahedrite, and argentite. It is traceable for 240 ft. and averages 2.2 ft-thick. Four small pits. The vein is inferred to contain 5,300 tons [illegible]	Close, 1985, p. 85

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
265	Valley View Prospect	14S	37E	34	Silver, Gold	No mineralized structure is exposed. Dump material indicated a quartz-calcite vein with limonite, malachite, and pyrite in a 20 ft. long, calcareous, metasedimentary xenolith in quartz monzonite. One 20 ft. trench. A grab sample from the dump had 0.031 oz. gold per ton, 0.26 oz. silver per ton, and 0.21 percent copper.	Close, 1985, p. 86
266	Auguste Mine	16S	38E	2	Gold	A fracture zone with irregular veins follows limestone beds intruded by quartz monzonite and andesitic dikes. The zone strikes N10° to 30°W and dips 10° to 30°SW. Most veins are 0.2 to 3.0 ft-thick, as long as 1,030 ft., and composed of quartz-calcite with limonite- and malachite-stained tetrahedrite, galena, and sphalerite. There are three underground workings totaling 1,700 ft., and several small prospect pits. Production from the underground workings is estimated to have been 1,000 tons of ore containing 20,000 oz. of silver and 10 tons of lead. The vein is inferred to contain 53,000 tons of material averaging 0.02 oz. gold per ton and 0.1 percent copper, based on three samples. Identified in extensive workings are about 78,000 tons that average about 0.07 oz. gold per ton, 12.7 oz. silver per ton, 1.3 percent copper, 1.0 percent lead, and 0.8 percent zinc.	Close, 1985, p. 71
269	Cerro Gordo Spring Millsite and FW Prospect	16S	38E	3		The spring is the only year-round source of water for many miles. In the 1870's, it was developed to supply water to Cerro Gordo and in the 1930's to supply water to the talc mining camp in Bonham Canyon. The FW Lode Claims were located over the spring in 1982. Equipment includes a dismantled pump, steam engine, water tanks, and pipeline. Water source for mine development.	Close, 1985, p. 74

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Cerro Gordo Mine Area, MRZ-2b(h-2)							
273	Cerro Gordo - Belshaw - Estelle	16S	38E	13	Lead, Silver, Zinc, Gold, Copper	Located in 1865 by Mexican miners, the Cerro Gordo district flourished after the Civil War with four lead furnaces and eleven mines in operation by 1872. During the seven years of bonanza ore production from 1869 to 1876, all the lead-silver ore and supplies to the Cerro Gordo mining district were shipped through Los Angeles. Because of this Los Angeles changed from a sleepy village to an important city. The Cerro Gordo mining district operated under hard conditions. The district is located near the crest of the Inyo Mountains in remote and rugged terrane with little water, high transportation costs, and heavy snowfall in the winter. In spite of these conditions, the miners between 1869 and 1935 produced 4.4 million oz. silver, 37,000 tons of lead, and 12,000 tons of zinc with gold and copper as an important smelter byproducts. The ore occurs as small shoots in fissures, as massive bodies in large steeply inclined pipes or "chimneys," in small isolated pockets, and in siliceous veins. The ore occurs mainly in north to northwest trending fissure and fractures in shattered marble and dolomite of the Lost Burro Formation with some rich ore shoots in fissured parts of the Jefferson diabasic dike. The zinc ore bodies are associated with massive lead ores that were derived by leaching of primary lead-zinc sulfide ores.	Merriam, 1963, USGS Professional Paper 408

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Last Chance Range Area MRZ-2b(h-3)							
88	White Cloud	8S	39E	20 N 1/2	Mercury, Gold	The White Cloud mine consists of three adits with a total of over 250 ft. of workings. The adits explore low angle faults between Bonanza King Dolomite, Zabriske Quartzite, and Rest Spring Shale which are reported to carry anomalous amounts mercury and gold. The faults dip to the west and contain calcite, limonite, hematite, cinnabar ( ), hematite after pyrite, and quartz. The hydrothermal alteration appears to be confined to the lower plate and the clay within the fault zone. The rocks have been silicified and one of the adits has an 8 ft-thick red fine-grained ferruginous clay zone with a strong smell of sulfur.	
90	Lucky Strike	8S	39E	29 NE 1/4	Uranium, Copper	The Lucky Strike includes one adit trending N15W for about 30+ ft. and one adit well-timbered at the entrance which extends 120+ ft. and trends N10°E. Mineralization is hosted by the Last Chance thrust fault and the Zabriskie Quartzite which is highly fractured. Mineralization occurs as torbernite, autunite, malachite, chrysocolla, and azurite, with limonite and gypsum filling fractures in the quartzite. U_3O_8 values are reported to range from 0.001 percent to 0.093 percent with copper values to approximately 0.11 percent (McHugh and others, 1984; and Wrucke and others, 1984).	McHugh and others, 198 , p. 16, 35; Wrucke and others, 1984, p. 16, 33
91	M a G 4	8S	39E	25 NE 1/4	Mercury, Sulfur	The M a G 4 prospect includes two bulldozer trenches 6 to 8 ft. deep by 20 ft. wide by 100 ft. long trending N70°W and N40°E along with numerous small exploration pits. Mineralization fills small north to northwest trending fractures and faults in Ely Springs Dolomite and consists of sulfur, cinnabar, gypsum, hematite, limonite, quartz, white clay, calcite (dogtooth spar) and possible sericite.	
92	Tiki No. 6	8S	39E	26 NE 1/4	Sulfur	Dozer cut along flank of hill that revealed minor alteration zone in dolomite but no associated sulfur mineralization.	
93	Texas American No. 67-68	8S	39E	26 SW 1/4	Sulfur	Dozer cut with small 15 ft. x 10 ft. pit within a highly brecciated, silicified dolomite that contains a pod of massive gypsum. Vein of sulfur 2 to 4 in. wide crosscuts the gypsum with a strike of N40°E and dips 45°E.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
94	El Dorado Lode No. 6	8S	39E	35 NE 1/4	Sulfur	Development consists of a series of dozer cuts along east side of a northeast trending ridge of brecciated dolomite that contains 1 to 1 1/2 ft. wide gypsum zones that strike N60°E and dip vertically. Small veinlets of silicified sulfur contained within gypsum.	
95	Big El Dorado	8S	39E	35 NW 1/4	Sulfur	Prospect developed by a series of shallow dozer cuts pits and trenches along a N50°E trending zone of altered and brecciated dolomite that contains small zones of gypsum and isolated blebs of sulfur.	
101	Midas No. 5	8S	39E	33	Sulfur, Mercury, Gold( )	The Midas No. 5 mine includes three 30 ft. deep by 30 ft. wide by 120 to 150 ft. long open cuts that trend N30°E, numerous exploration pits, a 10 ft. x 10 ft. screen, and eight large piles of screened quartzite. The mine is located in white highly fractured quartzite of the Zabriske Quartzite. The mineralization consists of fracture fillings of sulfur, gypsum, abundant hematite, quartz, limonite, copper oxides, chrysocolla, and cinnabar.	Lynton, 1938, p. 563-590
102	Christopher No. 2 Prospect	8S	39E	33	Mercury( )	This prospect consists of one open cut 12 ft. deep by 20 ft. wide by 100 ft. long trending S40°E and 3 parallel backhoe trenches 4 ft. wide by 15 ft. deep trending north. The prospect is located in highly fractured, varied colored quartzite and quartzite pebble conglomerate of the Zabriske Quartzite. White clay, gypsum, hematite, limonite, manganese oxide, and cinnabar( ) fills and coats the fractures in the quartzite.	
103	Aloha Prospect	8S	39E	33 SW 1/4	Mercury	The Aloha Prospect includes eight bulldozer pits up to 50 ft. long and 10 ft. deep, most trending N55°E in light gray shale and siltstone of the Perdido Formation and white quartzite of the Zabriske Quartzite. The shale and quartzite has been fractured and contains calcareous hot spring deposits with sulfur, gypsum, limonite, hematite, opaline quartz and minor cinnabar as fracture fillings. Wrucke and McHugh, 1984, report that one sample from this prospect carried 0.0214 lb. mercury per ton.	Wrucke and others, 1984, p. 17; McHugh and others, 1984, p. 17
104	Pebecca No. 4	9S	39E	4 NW 1/4	Mercury, Gold	This prospect has an open cut 100 ft. long by 6 ft. deep by 15 ft. wide, trending in a N45°W direction in white to cream colored Eureka Quartzite. The mineralization consists of cinnabar, gypsum, hematite, limonite, and sulfur( ) which fills fractures in a northwest trending shear zone in quartzite.	Wrucke and others, 1984, p. 17

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
105	Rebecca No. 2	9S	39E	4	Mercury, Gold	This prospect has an open cut 120 ft. long by 15 ft. wide by 10 ft. deep in fractured white Eureka Quartzite. The mineralization consists of cinnabar, gypsum, hematite, limonite, and sulfur( ) which fills a N45W vertical shear zone in quartzite.	Wrucke and others, 1984, p. 17
106	Lucky 13	8S	39E	31 SE 1/4	Mercury	The Lucky 13 mine consists of approximately 5,600 ft. of bulldozer cuts and trails, a furnace, and a collapsed cabin. The host rock is light gray to dark green shale and quartzite, which is sheared, broken, and bleached in a 20 ft-thick zore striking N20°W. The mineralization is cinnabar, clay, calcite, gypsum, quartz, hematite, and limonite which fills fractures. The zone has quartz veins and stringers of quartz, gypsum, and calcite. Wrucke and McHugh (1984) report that four samples contained 0.0012 to 0.06 lbs. of mercury per ton.	Wrucke and others, 1984, p. 16
107	Up and Down Mine	9S	39E	9 N 1/2	Mercury, Gold, Silver	The Up and Down mine includes two adits 38 ft. long and 55 ft. long, several levels of bulldozer cuts, a partially insulated wooden cabin in good condition, a mercury retort, a crusher, a hopper, and a rotary furnace. The mine is located in sheared dark gray shale and white to dark gray quartzite of the Wood Canyon Formation. The mineralization consists of cinnabar, hematite, alunite, limonite, quartz, opal, and gypsum which fills fractures in the highly fractured shale and quartzite. Wrucke and McHugh (1984) reported that twelve samples contained between 0.2 to 10.2 lbs. mercury per ton, and that one sample had 0.26 oz. gold per ton, and one grab sample contained 0.6 oz. silver per ton.	Wrucke and others, 1984, p. 17
108	Up and Down No. 1-6	9S	39E	9 N 1/2	Mercury, Gold( )	This mine has a small N15°W trending adit over 30 ft. long and an open cut 8 ft. deep by 20 ft. wide by 40 ft. long in sheared and fractured dark to light gray shale and white to tan quartzite of the Wood Canyon Formation. The mineralization consists of cinnabar, hematite, limonite, clay (alunite) and opalline quartz which fills fractures in a 10 to 20 ft-thick shear zone. Hydrothermal alteration extends an additional 20 ft. on either side of the shear zone and in places in the shear zone opal and quartz have recemented the broken quartzite.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
109	Mercury Knob Prospect	9S	39E	9	Mercury, Copper, Turquoise	The Mercury Knob prospect includes an open cut 120 ft. long by 50 ft. wide by 30 ft. deep, an inclined adit 10 ft. long N55°E at 20°, three small pits, a partially collapsed cabin, a grizzly, a ore bin, and and assorted mining equipment. The host rock is a sheared dark gray to black shale and siltstone that is part of the Rest Spring Shale. Mineralization consists of turquoise, chrysocolla, apatite, quartz, hematite, limonite, gypsum, wavellite, and cinnabar, ( ) which fills fractures and coat fissures in the shale. Five samples from the prospect contained between 0.011 and 0.086 lbs. of mercury per ton and between 0.01 and 0.08 percent copper (Wrucke and McHugh, 1984).	Wrucke and others, 1984, p. 17
110	Eureka Prospect (Bear Cat)	9S	39E	10 W 1/2	Mercury, Gold	The Eureka prospect includes a 55 ft. long adit trending S31°E, open cuts on four levels, and numerous exploration pits in white to tan Eureka Quartzite. The mineralization is cinnabar, hematite, pyrite, clay, apatite, and gold( ) which fills fractures and shears in northwest trending shear zones in quartzite. Of twelve samples by USBM, one contained 6 lbs. mercury per ton; two samples contained 0.006 and 0.008 oz. gold per ton.	Wrucke and others, 1984, p. 17
111	Sulphur Queen	8S	39E	10	Sulfur	The Sulphur Queen mine has one 80 ft. long by 30 ft. wide open cut which trends S80°E along with two small exploration pits and several bulldozer trenches and drill holes. The mine is located in light buff to dark gray Bonanza King Formation limestone and dolomite that is sheared and brecciated across an approximately 80 ft. wide zone, which trends N20W. The zone contains sulfur, gypsum, and clay and is reported by McHugh (1984) to contain an average of 6.4 percent sulfur.	McHugh and others, 1984, p. 18, 34; Wrucke and others, 1984, p. 17
112	April Fool Prospect	9S	39E	9 SE 1/4	Mercury	The April Fool Prospect includes a trench 340 ft. long by 30 ft. wide by 20 ft. deep, numerous bulldozer cuts, a jaw crusher, storage bins, along with various pieces of abandoned mining and household equipment. The prospect is located in fractured dark to light gray shale, white to tan sandstone and quartzite of the Wood Canyon and Perdido formations, along a branch of the Last Chance thrust. The mineralization consists of cinnabar, opal, gypsum, hematite, and limonite in 1/4 to 10 in. thick veinlets which fill fractures in a 20 to 30 ft. wide shear zone that is bleached and silicified. Wrucke and McHugh (1984) report that six samples from this prospect contained between 0.2 to 2.4 lbs. mercury per ton.	Wrucke and others, 1984, p. 18; McHugh and others 1984, p. 17

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
113	Storm Cloud	9S	39E	16	Mercury, Gold	The Storm Cloud includes approximately 3,000 ft. of bulldozer cuts and trenches most of which trend east-west and are a maximum of 20 ft. deep. The deposit consists of scattered cinnabar and hematite along fissures and fractures in highly fractured quartzite. The deposit contains between 0.0006 to 0.076 lbs. of mercury per ton with one sample containing 0.046 oz. gold per ton (Wrucke and others, 1984; McHugh and others, 1984).	McHugh and others, 1984, p. 18; Wrucke and others, 1984, p. 13
114	Sally Joe Eureka Sulfur	9S	39E	12 SW 1/4	Sulfur, Mercury	Series of shallow dozer trenches and pits exposes narrow seams of sulfur, manganese oxides and small veinlets of cinnabar in a section of limestone, quartzite and Tertiary fanglomerate that has undergone alteration by hot spring activity. The lowermost cut exposes altered and resilicified limestone with a 1/8 in. wide veinlet of cinnabar striking due west and dipping 80°N along with minor fracture coatings of cinnabar. Upper cut exposes massive gypsum overlying and intercalated with Tertiary fanglomerate composed principally of limestone clasts. Gypsum is exposed over 30 ft., contains blebs of sulfur but shows evidence of resilicifation. Cut contains five 3 in. od shallow, vertically oriented drill holes on a N30°W line. Of six USBM samples, one sample contained 58 percent sulfur, the remainder less than 1 percent; two samples contained 0.2 lb. mercury per ton.	McHugh and others, 1984, p. 18

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
El Capitan Mercury Mine Area, MRZ-2b(h-4)							
89	El Capitan	8S	39E	22 NW 1/4	Mercury	The El Capitan mine includes two shafts, a glory hole, and a large decline (Hill, 1972) trending N85°W, which appears to intersect an open pit 300 ft. x 100 ft. x 45 ft. deep. The pit trends N25°E. The ore occurs in irregular, funnel shaped and carrot-like vertical bodies that follow north and northeast trending faults. These ore bodies were the surface conduits for a hot springs system. The mineralization consists of cinnabar and metacinnabar in a gangue of gypsum, sulfur, opalline quartz, calcite, opalite, quartz, and dolomite. The dolomite within the area is altered, silicified, and bleached and often has a punky texture. Quartz stringers up to 3 in. thick occur within the mine area and the dolomite near the faults has been replaced by gypsum. The mine operated during the period 1967-1970, and according to United States Bureau of Mines records, produced 3,400 flasks mercury. Prospects adjoining the mine are reported to presently contain 0.002 to 10.2 lbs. mercury per ton (McHugh and others, 1984).	Hill and others, 1972, M.S. Thesis; McHugh and others, 1984, p. 14; Wrucke and others, 1984, p. 4, 13, 14, 32, 33
Loretto Mine Area, MRZ-2b(h-6)							
76	Loretto Mine (Bristlecone Copper Co.)	8S	37E	16	Copper	Workings consist of an 1,800 ft. deep shaft, several adits and an open pit which have developed a series of parallel, resilified quartz veins in quartz monzonite that strike S75° to 90°W and dip near vertical. Quartz is highly fractured and surfaces are coated with secondary copper minerals, principally malachite and azurite with minor chrysocolla. This is an old property, developed before 1900, the 1,800 ft. deep shaft was sunk between 1907-1915 in an attempt to intersect the sulfide zone, which proved unsuccessful and property became idle by 1915. Property had renewed interest in the early 1970's, with heap leach mill constructed and open pit mining commenced. The benching performed revealed that the secondary copper mineralization dies out along strike to the SE as the upper bench cuts reveal only barren sheared quartz monzonite. Minor, if any, production.	Waring and Huguenin, 1918, p. 73; Tucker, 1926, p. 464; Eric, K., 1948, p. 247; Norman and Stewart, 1951, p. 142; McHugh and others, 1984, p. 11

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Last Chance Range Area, MRZ-3a(h-1)						See property description under MRZ-2b(h-3), MRZ-2b(h-4) and MRZ-3a(h-6)	
Leah-Vanessa and Jenny B. Prospect Area, MRZ-3a(h-2)							
137	Leah-Venessa Prospect	11S	40E	6	Gold	Two inclined shafts trending N22W at 25° are 6 ft. and 15 ft. long and explore a 3 1/2 ft-thick fault zone that strikes N40°E and dips 25°NW. The fault zone contains quartz and opalline quartz veinlets along with hematite, limonite, and white clay. Samples taken from this site are reported to have secondary copper minerals and to average 0.099 oz. gold per ton with one sample having 0.624 oz. gold per ton (McHugh and others, 1984).	McHugh and others, 1984, p. 24; Wrucke and others, 1984, p. 22; Green and Latschar, 1981, p. 876-882
138	Jenny B.	11S	40E		Gold, Silver, Copper	The Jenny B. mine includes four adits 12, 47, 100, and 590 ft. long trending S10°E, a 25 ft. long inclined shaft, and several exploration pits and trenches. Mineralization appears to follow the Last Chance thrust. The sheared contacts between limestone and the overlying quartz-quartzite breccia contain quartz, limonite, hematite, hematite after pyrite, chlorite, and malachite. Samples across the 5 1/2 ft-thick, 100 ft. long limestone-quartz breccia contact averaged 0.132 oz. gold per ton, 0.14 oz. silver per ton, and 4.29 percent copper. A sample from one of the quartz veins contained 0.488 oz. gold per ton, 0.2 oz. silver per ton, and 4.9 percent copper (McHugh and others, 1984).	McHugh and others, 1984, p. 25; Wrucke and others, 1984, p. 22; Green and Latschar, 1981, p. 876-882

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Sugar Loaf Mountain Area, MRZ-3a(h-3)							
11	Inyo Boy No. 2 (Railroad Lady)	6S	37E	8 SE 1/4	Silver, Copper	Open cut with two interconnected adits following a 6 in. to 10 in. wide quartz vein that strikes N55°W and dips 70°N. Quartz vein shows minor copper oxides on fracture surfaces. Host rock is a highly sheared and fractured quartzite, but aside from FeO staining all mineralization appears confined to the quartz vein.	
12	Inyo Boy No. 5	6S	37E	8 SE 1/4	Silver, Copper	Four ft. by 6 ft. by 15 ft. deep shaft collared on a 1 to 3 ft. wide quartz vein that strikes N45°W and dips 75°N. Minor skarn with massive garnet, magnetite and secondary copper oxides of malachite and azurite has developed along the contact between the quartz vein and limestone units.	
13	Inyo Boy No. 1	6S	37E	8 SE 1/4	Silver, Copper	Series of shallow pits and trenches along a N60°W trending contact zone between quartz monzonite and a coarsly crystalline limestone. Small isolated pods of skarn are developed which show minor secondary copper staining along fracture surfaces.	
14	Inyo Boy No. 6	6S	37E	8 SE 1/4	Gold, Silver, Copper?	Caved adit, driven parallel to metasedimentary pendant or inlier within quartz monzonite which strikes near due west and dips vertical. Adit is completely sealed, however size of dump is indicative of a moderate amount of underground work. Isolated dump material shows fractured quartz with copper oxide staining and some massive hematitic gossan with well developed boxworks.	
20	Piper Mtn. Copper Mine	6S	37E	16	Copper	The Piper Mountain Copper mine includes three adits and an open cut trending N10° to N40°E in Josuha Flat Monzonite. Mineralization is a series of 1 to 5 ft-thick shallow NW dipping quartz veins, which strike NE and contain pyrite, chalcopyrite, azurite, malachite, and chrysocolla.	
21	Unknown	6S	37E	15 SW 1/4	Gold, Silver	Twenty-five ft. deep shaft on a massive hematite vein 5 ft-thick that strikes N40°W with near vertical dip, very extreme silicic boxworks developed on vein material which consists wholly of bright reddish-yellow FeO with no sulfides visible in dump material. Fe vein is coincident with the contact between quartz monzonite and a septa of crystalline limestone.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
22	Unknown	6S	37E	15 S 1/2	Gold	This mine consists of a large cut 6 ft. wide by 8 ft. high by 35 ft. long and numerous small exploration pits in white to light gray crystalline limestone which is cut by a N10°W fault. The mineralization consists of white clay and silica that fills the fault and coats the limestone breccia in the fault zone. The bleached and hydrothermally altered zone extends for approximately 12 ft. on either side of the fault.	
23	Piper	6S	37E	23 NW 1/4	Gold	Lower adit 50 ft. long in canyon bottom bearing N80°W. Adit is collared in resilified massive limestone that has been faulted. No obvious mineralization present.	
24	Piper	6S	37E	22 NE 1/4 15 SW 1/4	Gold, Silver	Series of pits, an adit, and four shafts over a length of 7,000 ft. along a quartz vein that is coincident with a contact zone between limestone-quartzite and quartz monzonite. The vein trends N10°W and dips 75°SW, with vugs, minor boxworks and FeO staining evident.	Burchard, 1883; Burchard, 1884, p. 99
25	Piper	6S	37E	23 NW 1/4	Gold	Partly caved adit bearing due east and collared in a cryptocrystalline quartzite. Adit was an attempt to intersect surfically localized gossan zone that has a a small pit on it.	
26	Sugarloaf Mt. Prospect (Piper)	6S	37E	22 NE 1/4	Gold, Silver, Copper	Workings include a series of three adits (caved or partly caved) along a mineralized shear zone closely associated with an igneous contact zone and a small septa of metamorphic calcareous sediments. Attitude is N40°W dipping 75°SW. Shear zone with quartz veining developed within a siltstone-limestone unit. Vuggy quartz vein from 1 to 3 ft. wide, that shows minor copper staining on fracture surfaces with minor pyrite boxworks.	Burchard, 1881, p. 39

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Westside Deep Springs Valley and Indian Garden Creek Area, MRZ-3a(h-4)							
1	Buck Mine(Kakuno, Lucky Boy)	55	36E	30 NW 1/4	Gold	The Buck Mine includes four adits trending from N45°W to N90°W and numerous exploration pits. One adit is timbered and two adits are partly collapsed. Mineralization consists of 3 to 10 in. quartz veins in hydrothermally altered 3 to 5 ft. wide shear zones in quartz monzonite. The quartz veins reportly carried free gold, galena, and hematite (CDMG, 1940). Sericite, pyrite and hematite after pyrite occur within the quartz veins and altered quartz monzonite along with clay. Mineralization appears to fill northwest trending frontal faults near the base of the range.	Sampson and Tucker, 1940, p. 127
2	Brown Rock No. 1	55	37E	30 SW 1/4	Gold	The Brown Rock No. 1 is a series of open cuts that extend east-west for 300 ft. and expose sheared quartz monzonite that contains a 3 to 6 in. quartz vein that strikes N65°W and dips 60°NE. The quartz vein contains scattered hematite after pyrite, limonite, sericite, with some coatings of epidote.	
3	Unknown	5S	37E	31 NE 1/4	Gold	The mine consists of an open cut 20 ft. x 40 ft. which trends N40°W in sheared and broken Beer Creek Quartz Monzonite. The cut follows a fault in the Quartz Monzonite which has been hydrothermally altered and contains light brown to light gray clay.	
4	Mono-Inyo Mine	5S	37E	32	Gold	The Mono-Inyo Mine includes one inclined shaft trending S 1/2 N5E at 65° to a depth of approximately 50 ft., one vertical shaft 50 ft. deep, and numerous open pits and cuts. Mineralization occurs as silicification and sericitization along a zone of faulting which strikes N10°W and dips about 70°E. Mineralization consists of hematite, limonite, quartz, sericite, with minor pyrite, chalcopyrite and copper oxides.	
5	Unknown	6S	37E	5 NW 1/4	Gold	A small 3 to 7 in. wide FeO stained shear trending due north and dipping 85°E in quartz monzonite has been developed by two shallow cuts and a 15 ft. deep shaft.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
6	Unknown	6S	36E	2 SW 1/4	Gold, Silver, Lead	Workings include one 380 ft. long adit, including a 21 ft. deep winze and 40 ft. of sublevel stoping, two inclined shafts, one caved incline shaft, one trench, and three pits. Quartz vein, .5 to 2.5 ft. wide, which strikes N35°E and dips east in granite contains galena and pyrite. The vein has been disrupted by folding and by normal faults which generally strike northwest and dip southwest. USBM estimated 8,300 tons of indicated resources with a weighted average of 0.12 oz. gold per ton, 0.37 oz. silver per ton, and 1.4 percent lead.	Diggles and others, 1983; Schmauch, 1986, p. 27
8	Gough No. 5	6S	36E	11 E 1/2	Silver( )	This mine has six partly collapsed untimbered adits 50 ft. long in Joshua Flat Monzonite. The adits explore .5 to 8 ft-thick quartz vein that strikes N50°E and dips 80°NW and contains small amounts of chalcopyrite, malachite, and azurite with trace amounts of galena.	
9	Nealy	6S	36E	12 W 1/2	Silver ( )	This mine has two partly collapsed adits and one completely collapsed adit trending N60°E in quartz monzonite. These follow a 8 in. thick quartz vein that strikes north and contains less than 1 percent hematite after pyrite, malachite, chrysocolla, and oppalline quartz.	
10	Unknown	6S	36E	14 NE 1/4	Silver( )	This mine has one open cut trending N45°W in quartz monzonite, which explores a small quartz vein that contains less than 1 percent copper oxides, hematite after pyrite, hematite straining, black dusty boxworks, and possibly galena.	
16	Unknown	6S	37E	18 NE 1/4	Gold	Collapsed adit bearing N80°E apparently driven to intersect a FeO stained aplite-quartz dike striking N65°W and dipping 65°NE. Minor magnetite in vein material, no other sulfides visible.	
17	Unknown	6S	37E	13 NE 1/4	Gold	Adit approximately 40 ft. long, which follows a FeO stained aplite dike bearing N40°W. Dike appears to contain widely disseminated, minute pyrite. No other sulfides in evidence in dump material.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
18	Fringe Benefit No. 1 (Lincoln, Silver Dome)	6S	37E	18	Silver	The Fringe Benefit No. 1 includes five shafts, some well-timbered, approximately 60 ft. deep, which trend east-west for almost 3,000 ft. The mineralization consists of a 6 to 12 in. thick quartz vein in quartz monzonite that strikes N80°W to east-west and dips 65° to 80° to the north. Mineralization consists of pyrite, chalcopyrite, copper oxides, hematite and opalline quartz. The vein has been reported to carry 100 ozs. of silver per ton (Tucker, 1920). The westernmost adit follows a hematite stained aplite dike bearing N40°W, which contains widely disseminated small pyrite crystals.	Tucker, 1920, p. 289
19	Cliff (Space Age No. 13)	6	36E	13 SW 1/4	Gold, Silver, Copper	Development consists of a series of two shallow pits and one 15 ft. caved shaft along a 4 to 5 ft. wide shear zone in quartz monzonite that contains small, brecciated quartz fragments. The shear zone is highly argillic, with secondary silification and strikes N70°E and dips 60°N small pieces of quartz on dump show FeO staining, limonite after pyrite, and minute spots of copper oxide (malachite) on fracture surfaces.	
31	Silver Queen Prospect	6S	36E	33 NE 1/4, 34 NW 1/4	Gold, Silver	Property has been developed by five adits totalling 380 ft. and eleven prospect pits along discontinuous quartz veins from 3 to 9 ft-thick that strike north to N10°E and dip 30° to 45°NW in quartz monzonite. Quartz veins have been brecciated and resilicified with silica-rich iron oxides with some angular quartz fragments ranging up to 3 to 4 ft. in diameter. Dump material of 2 to 18 in. wide quartz veins that strike N5°W reveals vein quartz with large 1 to 1 1/2 in. wide blebs of chalcopyrite, and smaller veinlets of galena usually in a matrix of hematite. Eighteen USBM samples showed: fifteen samples of vein quartz assayed 0.020 to 0.246 oz. gold per ton and averaged 0.075 oz. gold per ton; fifteen contained 0.3 to 6.8 oz. silver per ton and averaged 1.9 oz. silver per ton.	Diggles and others, 1983, p. 25

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
35	Lakeview Prospect	7S	36E	4	Gold, Silver	The prospect consists of five adits (two have a total of 550 ft. of workings) and over eleven prospect pits. The mineralization is a 2 to 5 ft-thick quartz vein that strikes N40°E and dips 50° to 85°NW. The massive, fractured, and heavily limonite-stained quartz vein fills a fault in Beer Creek Quartz Monzonite for approximately 5,000 ft. The vein contains less than 1 percent pyrite cubes and boxworks, up to 1/2 in. across and traces of galena along with secondary copper (malachite and chrysocolla), opalline and massive quartz, hematite after pyrite, limonite, clay and epidote. Selected samples are reported by Diggles and Blakely, (1985) to contain up to 0.104 oz. gold per ton and up to 2.4 oz. silver per ton with 0.22 percent copper.	Diggles and others, 1983, p. 25
36	Kesef Prospect	7S	36E	5 E 1/2 4 W 1/2	Gold	The Kesef Prospect includes one open bulldozer cut 20 ft. long x 6 ft. high and six prospect pits. The mineral-ization consists of a 6 to 24 in. quartz vein with pyrite cavities along with malachite and chrysocolla, which fills a N60°W, 10°SW dipping fault in Beer Creek Quartz Monzonite.	Diggles and others, 1983, p. 25
37	Thunder Bird Group	7S	36E	8 E 1/2	Gold, Silver	Property is developed by several adits, one 30 ft. deep shaft, one caved shaft and several small shallow pits and cuts. Main adit collared on a series of 2 to 18 ft. quartz veins that strikes N5°W and dips 35°E. Quartz veins are iron stained and contain pyrite and argenti-ferous galena. Shaft exposes a 3 to 4 ft. wide quartz vein which strikes N35°E and dips 70°E. Quartz is fractured, FeO stained, and contains pyrite and small blebs and veinlets of argentiferous galena. Eastern-most shaft sunk on 2 1/2 to 3 ft. wide quartz vein which strikes N25°E and dips 70°E with quartz showing minor resilicification. Remnants of a small mill on the property.	Burchard, 1881-83, p. 39; Goodyear, 1888, p. 237-9
38	Tungstar	7S	36E	7 SE 1/4	Gold, Silver	Workings include two short interconnected adits with day-lighted portals. Upper adit, 18 ft. long on 1 to 3 1/2 ft. wide quartz vein that strikes N10°W and dips 55°NE, vein has been exposed over a dip length of 30 ft. and consists of bull quartz which contains scattered mica and pyrite crystals. Lower adit 15 ft. long, shows concentration of FeO along footwall contact.	Burchard, 1881, p. 39

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
142	Six Pac	4S	35E	11 NW 1/4	Gold	Prospect consists of a small pit on a 2 to 5 ft. wide, bright red FeO stained, highly brecciated quartz vein that strikes N35°W and dips 50°W. Quartz vein has come in along a small shear or minor fault developed in a hornblende rich border facies of a diorite body. Aside from small, isolated pyrite cubes no other sulfides in evidence. No development and no production.	
143	Jeff No. 2	4S	35E	14 (projected)	Gold	Prospect discovery post located on north side of Toler Creek in an area that has FeO staining on quartz monzonite. Minor shearing trending N40°W to N60°W is associated with the mineralized zone and some shears contains small, widely scattered pyrite cubes. No workings are evidence although the acute angle of the slope could have covered minor exploration pits with colluvium.	
144	Unknown	5S	36E	22 NE 1/4	Gold	Prospect consists of a shallow, 2 to 3 ft. deep pit on a N70°W striking fault zone that is FeO stained and appears to be resilicified. Minor pyritization is associated with the fault zone as is kaolinization. Pyrite appears as isolated cubes within the fault zone or closely adjacent within the coarse grained porphyritic granite. Aside from pyrite no other sulfides appear. No development to prospect and no production.	
145	Unknown	5S	36E	15 SE 1/4	Silver, Lead, Gold	Prospect is developed by four shallow, 4 to 5 ft. deep pits and a partly caved adit bearing due south that appears to have provided access to east-west trending stopes. No quartz vein visible at portal, but alignment of pits probably indicates an east-west strike with a near flat dip to the south. Stoping indicate a quartz blowout or pod along strike of a mineralized shear or fault in quartz monzonite. Material on stockpile is white, yellowish-red stained quartz with large (to 1/2 in.) open pyrite boxworks and with blebs, masses and veinlets of coarsely crystalline galena. Four USBM grab or select samples from stockpiles contained up to 0.47 oz. gold per ton, 0.4 oz. silver per ton, and 0.10 percent copper. Some quartz shows a minor copper stain, and some ore appears to contain minor dessiminated chalcopyrite. This is an old property, circa 1870's-1880's and supported some production as cabins and evidence of a furnace exist in the canyon bottom.	Schmauch, 1986, p. 25

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
146	Astro No. 1	5S	36E	24 N 1/2	Gold	Workings consist of a 30+ ft. inclined shaft that trends N58°W at an incline of 42 degrees. The workings are developed along a northwest trending shear zone in quartz monzonite. The zone contains minor amounts of pyrite, hematite and limonite.	
147	Unknown	5S	36E	24 W 1/ 2	Gold	The prospect consists of one small pit in sheared quartz monzonite. The pit explores an 8 to 10 in. quartz vein that strikes N72°W, dips 70SW, contains small amounts chalcopyrite, hematite after pyrite, hematite, limonite, malachite, and clay. The vein occurs in a northwest trending shear zone that is 200 to 300 ft-thick.	
Whippoorwill-Jackass Flats Area, MRZ-3a(h-5)							
122	Silver Spur (Daisy Mine) (Bedell Mine)	10S	37E	13, 24	Lead, Silver, Zinc	Workings consist of five inclines and several small prospect pits along two quartz veins that occur along bedding planes in limestone and fissile slate of the Wyman Formation. Quartz veins are parallel, strike N30°E and dip 35°E, quartz is highly fractured, and contains masses and veinlets of argentiferous galena and pyrite. USBM production records credit 74 oz. silver, 854 lbs. lead and 0.8 oz. gold to the property. USBM sampling of dumps showed 2 to 5 oz. silver per ton, 3 to 14 percent lead, and 2 to 4 percent zinc. Chip samples revealed 18.1 percent lead, 2.6 percent zinc, and 1.2 oz. silver per ton.	Reports of State Mineralogist XV, XVII and XXII; McKee and others, 1983, p. 12
123	Opal Mine	10S	37E	24 NW 1/4	Lead, Silver, Zinc	Property has been developed by three adits totaling 220 ft. of underground workings, three shafts of 14, 28, and 43 ft. and eleven pits located in dark shale and thin bedded argillite of the Wyman Formation. The mineralization consists of a 3 to 4 ft-thick white quartz vein that intrudes a shear zone that strikes N20° to 35°W and dips 70°W. The vein, which contains massive argentiferous galena, pyrite, hematite and limonite was originally worked in the early 1900s to 1915. USBM assays of thirty-seven samples indicate that silver, lead, and zinc are erratically distributed, with only eight samples containing more than 1 oz. silver per ton. Vein material sampled showed an average grade of 2.86 oz. silver per ton and 4.56 percent lead. Production unknown.	Reports of State Mineralogist XV, p. 94, 104, XVII, XVIII, XXII and XXXIV; McKee and others, 1983

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
124	Opportunity Prospect	10S	37E	20 NW 1/4	Gold(?)	The Opportunity Prospect has two adits trending S62°W and S45°W in oolitic limestone of the Wyman Formation. The mineralization consists of white clay and small quartz veins that occur in a 8 to 10 ft-thick shear zone in argillaceous limestone.	Wrucke and others 1984, p. 19
125	Fuller Prospect	10S	37E	30 NE 1/4	Gold(?)	This mine has a 25 ft. long untimbered adit that trends N45°E in massive white to cream colored limestone of the Reed Dolomite. The mineralization consists of a 3 to 12 in. thick quartz vein that strikes N45°E and contains scattered hematite after pyrite, which are up to 1 mm in size and some minor clay.	Wrucke and others, 1984, p. 19
126	Lee Prospect (Lucky Hike)	10S	37E	30 SE 1/4	Silver, Lead, Copper	The mine consists of two adits 87 ft. and 88 ft. long and two inclined partially collapsed adits 95 ft. and 150 ft. long trending S75°E at 35° along with several open pits. A 12 in. quartz vein strikes N22°E 34°E in quartzite for 3,600 ft. and contains argentiferous galena, sphalerite, pyrite, hematite, and opalline quartz.	McHugh and others, 1984, p. 10, 20; CDMG, 1915, Report 15, p. 100
127	Gingerbell "Apex" Prospect	10S	37E	29 NE 1/4	Lead, Zinc, Silver (?)	Small exploration pit which explores a 2 to 60 in. quartz vein in limestone, argillite and quartzite. Mineralization consists of quartz, hematite, limonite and galena (?).	Wrucke and others, 1984, p. 19
128	August Prospect (Whippoorwill No. 1)	10S	37E	32 NE 1/4	Silver, Lead, Copper, Zinc	The mine has one 78 ft. untimbered adit trending N80°E, one 27 ft. inclined adit at N30°E, and one small open pit in massive dolomite. The mineralization is argentiferous galena, chalcopyrite, sphalerite, clay, quartz, copper oxides, and hematite in 8 to 18 in. thick quartz veins and associated veinlets which extend for 1,000 ft. Selected samples are reported by McHugh (1984) to contain 12.9 oz. silver per ton, 2.2 percent zinc, 1.68 percent lead, and 0.88 percent copper.	McHugh and others, 1984, p. 20
129	Ruby Port	10S	37E	32 E 1/2	Silver, Lead, Copper	The Ruby Port mine includes a one 37 ft. inclined shaft trending S20°E at 25° and three open cuts 20 ft. deep by 30 ft. long by 5 ft. wide located in the upper member of the Reed Dolomite. The mineralization consists of argentiferous galena, malachite, chrysocolla, and hematite in a 9 in. thick quartz vein which strikes N65E 25°S for a distance of 530 ft.	McHugh and others, 1984, p. 20

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
130	Del No. 1 (Bonnie, Newcastle Prospect)	10S	37E	31 SE 1/4	Copper, Gold, Silver, Zinc	The Del No. 1 mine has one inclined 37 ft. adit which trends S60E at 25°, a 8 ft. deep shaft, and six small pits. The mine is located in white to tan, thick bedded Reed Dolomite and consists of a series of north to northeast trending veins, one of which is 1,700 ft. long and offset by two faults. The mineralization consists of argentiferous galena, pyrite, chalcopyrite, sphalerite, malachite, along with hematite, limonite and opaline quartz. Wrucke, 1984, reports that selected samples contained up to 3.2 oz. silver per ton and 5 percent lead.	Wrucke and others, 1984, p. 22
131	Hillside Prospect	10S	37E	23 SE 1/4	Lead, Silver	Development consists of a 55 ft. long adit collared on a 5 to 7 in. quartz vein that occurs in dolomite and strikes N50°E and dips 45°N. Quartz vein contains small pods and veinlets of argentiferous galena, lead oxides (cerrusite) and minor amounts of limonite (after pyrite). Two USBM chip samples contained 0.8 and 2.0 oz. silver per ton, and 1.97 and 6.80 percent lead.	Wrucke and others, 1984 p. 21
132	Emma (Hillside No. 1) Prospect	11S	37E	4 NE 1/4	Lead, Silver	Workings consists of two adits, 30 ft. and 25 ft. long on a 5 to 7 in. wide quartz vein that strikes N40°E and dips 65°NW. Vein occurs along the sheared contact between quartzite and limestone and contains small pods of argentiferous galena and pyrite. Quartz vein shows a rapid decrease in width to 1 to 2 in. over a vertical distance of 15 to 18 ft. and quartz shows minor resilicification. USBM chip samples averaged 3.2 oz. silver per ton and 4.25 percent lead. One grab sample of a stockpile had 0.6 oz. silver per ton and 1.68 percent lead.	Wrucke and others, 1984, p. 21
133	Morning Star (Pine Tree Mine)	11S	37E	2 SW 1/4	Lead, Silver	The mine consists of one partially collapsed 30 ft. adit trending S40°W, one 25 ft. inclined shaft N10°W at 70°, and sixteen open cuts and exploration pits in Campito Formation (sandstone and siltstone). Seven N30°W to north trending mineralized shear zones contain quartz veins that carry fine-grained masses of black sooty argentiferous galena, pyrite, hematite, and limonite. According to USBM sampling, of nineteen chip samples, values in sixteen ranged from 0.2 to 3.0 oz. silver per ton and from 0.47 to 7.0 percent lead. A 600 ft. long 1.9 ft. wide vein averaged 0.9 oz. silver per ton and 2.2 percent lead; three other zones averaged 1.1 oz. silver per ton and 2.37 percent lead. USBM credits seventeen tons shipped in 1968 that contained 13.5 percent lead and 4 to 5 oz. silver per ton.	McHugh and others, 1984, p. 23; Wrucke and others, 1984, p. 21

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Last Chance Spring Area, MRZ-3a(h-6)							
59	Claimar No. 5	8S	40E	6 NW 1/4 (projected)	Lead, Silver	Development consists of a 15 to 18 ft. long adit driven on a bearing of N15°E through a quartz vein that strikes N10° to 20°E and dips 25°E and several shallow prospect pits along strike. Quartz vein is 6 to 15 in. wide bull quartz, heavily stained with FeO, and containing blebs and veinlets of argentiferous galena. Selected sample of dump material assayed: 6 oz. silver, 0.25 oz. gold, and 1.7 percent lead per ton.	
60	Unknown	7S	39E	35 NE 1/2 (projected)	Gold	Workings consist of an adit bearing S10°W, length unknown as it was filled with snow and a 12 ft. x 10 ft. shaft approximately 30 ft. deep that has been collared on a quartz vein that strikes N70°W and dips 80°S. Quartz vein is 4 1/2 to 5 ft. wide, is exposed over a length of 100 ft., and occurs between a black, massive limestone and a light tan, recrystallized silty limestone with interlayers of shale. Mineralization consists of rotten sulfide cores of pyrite and chalcopyrite surrounded by secondary copper halos. Selected dump sample assayed: 8.1 oz. silver per ton and 1.62 percent copper per ton.	
61	Milovitch No. 1	8S	39E	2 NE 1/4	Gold	Workings consist of two small pits 5 to 7 ft. deep and about 20 ft. of trenching along a felsic quartz vein in quartz monzonite that strikes due north and dips 75° to 80°E vein contains vuggy quartz crystals, amorphous silica and small, disseminated limonite pseudomorphs after pyrite. Brecciated vein material is coated in places by secondary copper minerals (malachite and chrysocolla).	
62	Milovitch Prospect	8S	39E	2 S 1/2	Gold	Workings include an adit bearing S30°W on a mineralized shear zone striking S30°W and dipping 75°W. An incline bearing N40°W and a 6 x 6 shaft 50 ft. deep sunk on manganese stained vein striking N40°W. Veins vary from 2 to 4 ft. in width and are within quartz monzonite host rock. Very minor copper oxides (principally malachite) on fracture surfaces of material contained upon the shaft dump but no sulfides obvious. Composite sample from incline and shaft assayed .47 oz. silver per ton and .001 oz. gold per ton.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
63	Bunker Hill (Milovitch)	8S	39E	2 SE 1/4	Gold	Series of caved adits and shallow pits along a N40° to 50°W contact zone between quartz monzonite and a massive crystalline limestone. Contact shows extensive shearing and argillization but very minor FeO staining along fracture surfaces. Dump rock also exhibits resilification with opaline and drusy quartz developed in vugs and cavities.	
64	Unknown	8S	39E	11 NW 1/4	Mercury(?)	Dozer cut 100 ft. long exposes white recrystallized limestone. No sulfides or silification present; probably exploration performed for possible NE extension of El Capitan mercury deposit.	
Willow Spring Area, MRZ-3a(h-7)							
49	Ford Prospect	7S	39E	14 NW 1/4 (projected)	Gold	Workings consist of a caved adit bearing N30°W and a caved 18 ft. deep shaft. Both the adit and shaft are on a 3 to 4 ft. wide FeO stained shear zone in quartz monzonite that strikes N30°W and dips 55°N. Dump material reveals heavily FeO (limonite) stained brecciated quartz that shows an abundance of pyrite boxworks. This property probably supplied ore for the small mill at Willow Spring. Selected dump sample assayed: 0.42 oz. silver, 0.15 oz. gold, 0.38 percent lead.	
50	Unknown	7S	39E	15 SW 1/4 (projected)	Gold	Open cut 5 to 6 ft. deep, 25 ft. long along a 1/4 in. wide FeO stained shear trending due north in quartz monzonite.	
52	Clairs Heavy Lode 1	7S	39E	15	Gold?	Two caved adits collared on a N50°E FeO stained zone in quartz monzonite. Amount of dump material indicative of 100 ft.+ of drift; dump material is barren of sulfides.	
53	Unknown	7S	39E	16	Gold?	Adit bearing N30°E collared in a FeO stained zone in quartz monzonite with no primary mineralization in evidence.	
54	Willow Spring Prospects	7S	39E	16	Gold?	Small 5 ft. deep pit on quartz rich aplite dike striking N45°W and dipping 45°N. Minor FeO staining on fracture surfaces; no obvious mineralization present.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Lower Alum Creek Area MRZ-3a(h-8)							
65	Rat No. 33	8S	40E	10 SW 1/4	Gold	Upper slot cut 20 ft. by 15 ft. deep along a N80° to 90°E massive quartz vein that occurs within highly brecciated Tertiary volcanic tuff. Quartz appears barren except for minor FeO along fracture surfaces, and exhibits large solution cavities (4 to 8 in.) lined with terminated quartz crystals. Seven ft. x 7 ft. x 25 ft. deep shaft and small pit collared within an E-W striking near vertical shear zone. Shear zone appears highly brecciated and resilicified, with heavy FeO staining on fracture surfaces. Adit driven on S50°E bearing to intersect large quartz vein approximately 50 ft. lower than surface outcrop. Adit is at least 50+ ft. long and is collared in volcanic tuff breccia. No sulfides except iron visible at any of the above workings.	
66	Lower Alum Creek Prospects (Amoco)	8S	40E	15 NW 1/4 (projected)	Gold	Series of dozer cuts 5 to 15 ft. deep in a FeO stained, silicified volcanic tuff. Minor boxworks present, but no sulfides visible.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Nelson Range Area, MRZ-3a(h-9)							
190	Copper Queen-Lucky Boy	16S	40E	17, S 1/2 20 N 1/2	Copper	These mines consist of two adits, one inclined shaft, several prospect pits, and one collapsed cabin. Two 5 ft. to 6 ft. wide quartz veins strike N20°E at 53°W and N25°E at 67°W occur in Hunter Mountain Quartz Monzonite near its contact with the Bird Spring Formation (limestone). The mineralization consists of chrysocolla, malachite, azurite, hematite, and limonite in milky quartz veins. Copper oxides staining and alteration (clay and epidote) extend into the quartz monzonite adjacent to the veins and skarn (garnet and epidote) has developed along some sections of the contact between the Bird Spring Formation and the Hunter Mountain Quartz Monzonite.	McAllister, 1955, p. 50
191	Cerrusite Mine	16S	40E	7 (projected)	Lead, Silver	Mine workings consist of three trenches 200 ft. long at about 100 ft. intervals driven along quartz veins that strike N60° to 65°E and dip 60°N. The ore contained 0.2 oz. siliver per ton, 0.01 percent lead, 0.50 percent zinc, and 0.07 percent WO_3.	Tucker and Sampson, 1938, p. 434; McAllister, 1955, p. 32-33, 42-43
192	Pinion Extension (Birdspring Garnet)	16S	40E	7	Lead, Silver, Copper	A series of shallow surface cuts and several short adits explore a zone of copper-stained tactite. The tactite has developed along the contact between limestone and quartz monzonite. An unsuccessful attempt was made to market garnet in the early 1980's.	McAllister, 1955, p. 50
193	May B Prospect	16S	40E	6 (projected)	Lead, Silver, Copper	Series of shallow pits, short adits and shaft explored a quartz vein that strikes N75°E and dips vertical. The vein consists of quartz, coarse calcite, some jasper, iron oxides, cerrusite and is stained with secondary copper minerals. Some of the quartz stringers, which are mostly less than an inch thick or are pockets, contain minor blebs of galena.	McAllister, 1955, p. 50
195	Unknown	16S	40E	18 (projected)	Lead, Silver	Working consist of an open cut about 25 ft. long, and one adit on a quartz vein in shale and marble that strikes N85°W and dips 80°N. Veins consist of quartz and calcite with scattered pods (up to 4 in.) and blebs of coarse-grained galena.	McAllister, 1955, p. 43

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Copper Canyon Area, MRZ-3a(h-10)					Gold, Copper	See property descriptions under MRZ-3a(s-2)	
Soldier Canyon Area, MRZ-3a(h-11)							
33	Eureka Silver No. 4	6S	37E	34 SW 1/4	Gold	Several dozer cuts, trenches and roads along contact between quartz monzonite and crystalline limestone. Minor FeO staining and evidence of resilicification in brecciated contact that although variable, generally strikes due north and dips 40° to 70°E. Small jasperoid veins present in a seritized zone within quartzite to the east. Jasperoid material contains blebs and veinlets of crystalline hematite, usually as isolated, incompletely oxided xenoliths. Jasperoid veins, 2 to 12 in. wide strike N5°E and dip 70°E. Property has had recent exploration activity which may have included drilling.	
34	White Elephant	7S	37E	6 NW 1/4	Gold	Series of shallow dozer cuts, pits and trenches for 400 ft. along 6 to 18 in. wide brecciated quartz vein that strikes N30°E and dips 35°E. Quartz shows resilicification and minor hematite veinlets and boxworks developed but no other visible sulfides.	
39	Valley View No. 1-5	7S	37E	9 NW 1/4	Copper, Silver	Workings consist of a 40 ft. deep incline with short crosscuts and several hundred feet of dozer cuts and trenches along 2 to 3 ft. wide brecciated quartz vein in quartz monzonite that strikes N90°W and dips 45°S. Quartz is highly fractured and fractures filled with hematite. Quartz is coated with secondary copper minerals, principally azurite and malachite with minor chrysocolla. Dump material is all well oxidized with only small, scattered blebs of sulfides (chalcopyrite) visible and these only as residual cores.	
40	Eureka Copper No. 8-12	7S	37E	8 SW 1/4	Copper	Small open cut on north side of Soldier Canyon on 100 ft. zone containing a series of parallel quartz veins that strike N65°W and dip 40°E. Veins are 1 to 12 in. wide, bull quartz with minor hematite veining, and contain pyrite, chalcopyrite , calcite and minor secondary copper staining on fracture surfaces.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
41	Lipp Prospect (Wyler Spring)	7S	37E	18 SE 1/4	Silver, Gold, Lead	Series of six pits, one 25 ft. deep inclined shaft, one partly caved incline 40 to 50 ft. deep, two 35 ft. and one 100+ ft. long adits have developed a 2 to 3 ft. wide brecciated quartz vein in quartz monzonite that strikes N20° to 40°E and dips 55°W. Quartz is highly fractured, shows a massive hematite matrix filling, disseminated blebs, pods and veinlets of argentiferous galena and fracture coatings of secondary copper, principally malachite. Quartz vein is exposed over a length of 7,200 ft. and shows development of a 3 to 15 ft. wide clay zone with well developed slickensides on the hanging wall. Composite grab samples from pits and shaft dumps ran .94 oz. silver per ton and .03 oz. gold per ton, select samples from incline and adits had 7.08 to 7.67 oz. silver per ton and .32 to 2.04 oz. gold per ton. Workings probably pre-date 1900's and probably had some high grade production although no records exists. Old cabin on the property.	
Juanita Prospect Area, MRZ-3a(h-12)							
141	Juanita Claim	10S	42E	6,7,16, 15	Gold	The prospect consists of small pits and geochemical sample sites. These explore northwest trending faults and shears in Paleozoic limestone and shale, which have been silicified, bleached and altered. The mineralization consists of quartz, sericite, clay, hematite after pyrite, hematite, and limonite. Hydrothermal fluids have formed gold-bearing jasperiod in the sheared and faulted portions of the limestone and shale. Gold values are reported to be as high as 1.6 parts per million along with anomalous concentrations of silver, arsenic, antimony and mercury.	Wrucke, Marsh, and Miller, 1985, OFR 85-215; Watson, 1985
Upper Warm Spring Area, MRZ-3a(h-13)							
166	Black Diamond Prospect	13S	39E	4 SW 1/4 9 NE 1/4	Manganese, Tungsten	Series of seven shallow pits and dozer cuts and one drill hole in reddish black travertine deposits occurring in an area of collapsed solution tunnels between Upper Warm Range, Spring and the Saline Range. Of fourteen USBM samples, four chip samples across banded manganese oxides and calcite contained between 1.00 and 1.80 percent manganese, and 0.05 to 0.09 percent tungsten trioxide (WO_3); one chip across tufa with pyrolusite had 2.4 oz. silver per ton. Norman and Stewart (1951) reported 20 to 30 percent manganese and 0.24 to 0.63 percent WO_3 in samples from the prospect.	Norman and Stewart, 1951, p. 192; McHugh, 1984, p. 26; Wrucke, 1984, p. 23, 32

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Rainbow-Celjemp Prospect Area, MRZ-3a(h-14)							
70	Cel Jemp	8S	36E	11 SW 1/4	Gold	Small open pit 5 ft. deep on a 2 to 6 in. wide quartz vein that strikes N10°W and dips vertically. Vein is white, milky quartz, FeO stained, with small (1-3mm) isolated limonite psuedomorphs of pyrite crystals.	
71	MeJec	8S	36E	14 NW 1/4	Gold	Slumped open pit about 18 ft. deep (caved shaft?) collared on a 4 to 7 in. wide milky quartz vein that strikes N75°E and dips 70°S in quartz monzonite. Quartz is FeO stained, and shows evidence of resilicification with development of drusy quartz infillings. Dump samples show minor pyrite crystals within quartz. No other sulfides noted.	
AJA Tungsten Prospect, MRZ-3a(h-15)							
27	AJA Tungsten Claims	6S	38E	14	Tungsten	The AJA Tungsten Claims include two shafts 5 ft. and 8 ft. deep and numerous exploration pits in partially altered quartz monzonite that contains both a small quartz vein and a small fluorite vein, which have small amounts of pyrite, hematite, quartz, fluorite, clay, sericite and chalcopyrite.	
Sylvia Mine Area, MRZ-3a(h-16)							
115	Silvia Mine (Silver Bowl)	9S	41E	1	Silver, Gold	The Silvia mine includes five small adits trending N to N15W up to 35 ft. long along with numerous exploration pits in granodiorite. Mineralization consists of a series of quartz veins up to 18 in. thick which strike N4°W and dip 32°W. The veins contain less than 1 percent pyrite, along with hematite after pyrite, limonite, hematite, chalcopyrite with halos of chrysocolla, malachite, epidote, quartz and opaline quartz. The quartz veins appear to fill faults and fractures in the rock. These veins are reported by Miller to carry 2.2 oz. silver per ton and 0.005 oz. gold per ton.	Miller, 1983, p. 9

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Spanish Spring Area, MRZ-3a(h-17)							
184	Monarch Mine	15S	41E	31 (projected)	Gold, Silver, Tungsten	Workings consist of six partly caved and inaccessible shafts. Partridge (1941) cited development of a 50 ft. deep shaft with a 250 ft. crosscut at the bottom along a 2 to 6 ft. wide quartz vein that strikes N20° to 60° W and dips 70° N. There also appears to be a caved adit in the canyon bottom between the two southernmost shafts. The quartz vein is within quartz monzonite and is fractured. Dump material reveals minor secondary copper minerals. USBM chip sample across the shear zone on the surface contained no significant values. A select sample of vein quartz from a dump contained 0.07 oz. gold and 10.1 oz. silver per ton, 2.30 percent copper, 1.5 percent antimony, and 0.03 percent tungsten trioxide (WO_3); another had 13.7 oz. silver per ton and 0.62 percent WO_3; the third had 11.2 oz. silver per ton, 0.32 percent copper, and 0.06 percent WO_3. This is an old property that was probably being mined by Mexicans in the 1860's to 1870's for silver ore (tetrahedrite) which was milled at the arrastas and crude retort at Spanish Spring. A small production of scheelite was recorded in 1915.	Waring and Huguenin 1915, p. 131; Partridge, 1941, p. 311; McAllister, 1955, p. 51, 56; Causey and others, 1983, p. 10
185	Unknown	15S	41E		Gold?	Prospect consists of two shallow pits that explored a 2 to 4 in. wide, silicified shear zone in quartz monzonite that trends due east-west. Zone contains minor chalcedony but does not contain any sulfides.	
186	Tourmaline No. 1-4	16S	41E	4 (projected)	Tourmaline, Copper	Workings consist of five shallow dozer trenches and one shallow 5 ft. deep pit on a quartz-pegmatite vein in quartz monzonite that strikes N40° W and dips 70° SW. Vein appears to vary in width from 1 to 3 ft. and tourmaline-quartz forms pods as large as 3 ft. in diameter. Tourmaline occurs as crystal intergrowths up to 3 in. long, although larger crystals were reportably produced when the prospect was mined for specimen material. Quartz shows minor iron oxide staining and isolated blebs of secondary copper minerals were noted. USBM sampled the prospect: of four samples, the highest values were less than 0.002 oz. gold per ton and 0.1 oz. silver per ton. One sample from the pit had 0.27 percent copper.	McAllister, 1955, p. 62; Causey and others, 1983, p. 10

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
187	Green Quartz (Hourglass) Claim	16S	41E	21 (projected)	Copper	Prospect consists of five shallow pits located along a pegmatitic quartz vein in Hunter Mountain quartz monzonite that strikes S60°W and dips 50°S. Quartz vein contains malachite, azurite, chrysocolla, and small disseminated blebs of bornite. Quartz outcrop is approximately 100 ft. long and 40 ft. wide, but copper mineralization is confined to several small areas.	McAllister, 1955 p. 50, 52; Leszcykowski, 1985, p. 12

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Lead Canyon Area, MRZ-3a(h-18)							
153	Emma No. 1-9	12S	37E	4 NE 1/4 (projected	Lead, Silver?	Workings consist of an open cut and an adits driven due south on a massive ferruginеous sandstone that strikes due north and dips 20°E. Bedded unit is continuously exposed for 200 ft. a long south side of canyon although width varies from 1 to 6 ft. Pyrite cubes (limonite psudomorphhs) are finely disseminated throughout sandstone and appear to be the result of formation wthin an anaerobic depositional evvironment. Production unknown.	
154	Lucky Josephine No. 11 a 17	12S	37E	9 NW 1/4 (projected)	Lead, Silver	Property development consists of a series of eleven adits, driven on headings of due north to N40°E, upon a 1 to 2 ft. wide, brecciated quartz vein that has a nearly horizontal attitude. The adits are all within a 200 yd. long zone along the north side of a small canyon. Vein material is quartz with hematite infilling and some dump material shows blebs and veinlets of argentiferous galena.	
155	Bunker Hill Mine	12S	37E	5	Lead, Silver	The Bunker Hill mine includes seven adits, one of which has collapsed to the surface, and numerous small exploration pits that explore a mineralized zone that trends generally N70°E and dips 75°S. The mine equipment consists of a 1,500 ft. aerial tram along with crushing and screening equipment. Mineralization consists of black sooty massive galena, up to 2 in. thick, small clear grains of cerussite, hematite, hematite after pyrite up to 5 cm on a side, and scattered veinlets of quartz. Ore that has been shipped is reported to have carried from 30 percent to 60 percent lead, 33 oz. per ton silver, and 0.1 oz. gold per ton (Tucker and Sampson, 1938).	Tucker, 1921, p. 283; Tucker and Sampson, 1983, p. 469
156	Blue Monster Mine	12S	37E	20 N 1/2	Lead, Silver	This mine was first discovered in 1907 and worked until 1911. The amount of production is unknown but the ore, which was packed out over the crest of the Inyo Mountains, was reported to have values of over $100 per ton lead and silver (Knopf, 1918). The mineralization consists of a series of northwest trending quartz veins and galena in dark gray to white dolomite of the Bonanza King Formation. The initial discovery was on a 3 1/2 ft-thick vein of galena and quartz with minor amounts of pyrite, cerussite, tetrahedrite and chrysocolloa.	Knopf, 1918, p. 117 and 118; Eric, 1948, p. 248; Tucker, 1921, p. 290; 1926, p. 490; 1938, p. 426, 447, 476; Norman and Stewart, 1951, p. 180

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Mineral Hill Group and Iron Age Area, MRZ-3a(h-19)							
83	Unknown	8S	35E	13 SW 1/4	Gold	An adit trending N80°W for about 20 ft. in dolomite (Poleta Formation) explores an elongate body of massive hematite, limonite, quartz, hematite after pyrite, and pyrite. The body is from 2 to 25 ft. thick and 100 to 150 ft. long with quartz blebs and stringers in massive hematite.	
84	Iron Age Mine	8S	35E	24 NW 1/4	Gold	The Iron Age mine includes several small exploration pits and a 70° inclined shaft which trends southwest and follows a fault zone that strikes N30°E and dips 60°NW that is 4 to 5 ft. wide. The zone contains massive pyrite, hematite and limonite with minor quartz stringers and blebs.	
85	CMB Lode	8S	36E	29 NW 1/4	Lead, Silver	The CMB Lode includes two adits, trending S10°W and S15°E, and a 400 ft. wireline tram that explore a 5 ft-thick quartz vein that fills a N40°E trending near vertical fault between Reed Dolomite and Deep Springs Formation. Mineralization consists of hematite, galena limonite, quartz, and hematite after pyrite.	
149	Mineral Hill Group	8S	36E	29 N 1/2	Lead, Silver	The mine consists of eight adits, three of which are open, and over 800 ft. of underground workings. The adits explore a series of lead and silver bearing veins in the Reed Dolomite. The veins are 12 to 4 ft. thick and strike N10° to 30°E and dip from 30° to 70° east. The mineralization consists of galena and cerussite which fill irregular fractures in the dolomite. The mine was worked in the 1920's and is reported to have shipped ore that was 30 percent lead and carried 30 oz. of silver per ton.	Tucker, 1926; CDMG Journal, v. 22, p. 487

MINE NO.	NAME	LOCATION T.	LOCATION R.	LOCATION SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
MRZ-3b(h-1)						See Text for explanation of MRZ-3b classifications.	
MRZ-3b(h-2)						See Text for explanation of MRZ-3b classifications.	
MRZ-3b(h-3)						See Text for explanation of MRZ-3b classifications.	
MRZ-3b(h-4)						See Text for explanation of MRZ-3b classifications.	
MRZ-3b(h-5)						See Text for explanation of MRZ-3b classifications.	
MRZ-3b(h-6)						See Text for explanation of MRZ-3b classifications.	
MRZ-3b(h-7)						See Text for explanation of MRZ-3b classifications.	
MRZ-3b(h-8)						See Text for explanation of MRZ-3b classifications.	
MRZ-3b(h-9)						See Text for explanation of MRZ-3b classifications.	
MRZ-3b(h-10)						See Text for explanation of MRZ-3b classifications.	
MRZ-3b(h-12)						See Text for explanation of MRZ-3b classifications.	
Copper Queen Mine Area, MRZ-3a(s-1)							
7	Copper Queen (Oasis)	6S 6S	37E 36E	7 12	Copper, Tungsten	The Copper Queen mine includes one adit 60 ft. long trending west in quartz monzonite at the contact with overlying limestone. One inclined shaft trending N30W in limestone near the contact with the underlying quartz monzonite. Numerous shafts and adits as well as open cuts in limestone near the contact with the underlying quartz monzonite. The mineralization consists of irregular garnet - epidote skarn and quartz veins up to 1 to 2 ft-thick that carry copper oxides, pyrite (up to 1 in. on a side) and chalcopyrite along with hematite and limonite. This mine is reported to carry tungsten as scheelite.	Eric, 1948, p. 249; Jenkins, 1942, p. 324; Norman and Stewart, 1951, p. 140; Tucker, 1926, p. 464; Waring, 1918, p. 73-74

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Sylvania Canyon Area, MRZ-3a(s-2)							
28	Midnite No. 3-4	6S	38E	25 NW 1/4	Tungsten	Workings consist of two adits, one small pit, and a series of dozer cuts. Upper adit is collared in a 10 ft. wide massive pyrope garnet zone that strikes S15°W and dips vertical. Pyrope zone is bordered by incompletely altered carbonate rock and carrys a 2 to 3 ft. wide zone in the center of crystalline quartz, epidote, faceted garnets and small dessiminated scheelite crystals. Lower adit is collared in a 6 to 8 ft. wide zone of massive crystalline garnet with quartz and epidote that strikes S50°W and dips 75°S. Total width of skarn zone exceeds 60 ft., although small septas of quartz monzonite occur within zone, adit exceeds 15 ft. in height and appears to have been stopped. Small 8 ft. deep pit (caved) on a mineralized shear striking N55°W and dipping 50°S in massive pyrope garnet. Shear shows copper staining (malachite and chrysocolla) along fracture surfaces. The extent of underground workings and ore loading chute indicate some ore production; however actual production is unknown.	
29	Moon Mining Co.	6S	38E	25, 26	Tungsten	Series of shallow dozer cuts and trenches, several short adits, one shallow shaft and small open stope that explored contact zone between limestone and quartz monzonite that has a regional strike of N70°W variable dips of 40-75°S. Small pods of tactite developed along a mile long zone with widths varying between 6 in. to 20 to 25 ft. wide. Widest exposure has been opened up by an open stope that reveals massive pyrope garnet but appears void of tungsten mineralization.	
42	Midway Group	7S	39E	10	Gold	The Midway Group includes two open cuts approximately 20 ft. wide by 12 ft. high by 10 ft. deep in quartz monzonite that contains 10 to 15 ft-thick quartz veins. The quartz veins trend N10W and S35W and contain abundant hematite with limonite staining and less than 1 percent chalcopyrite, malachite, and chrysocolla.	
43	Midway Skarn (Copper World, patented)	7S	39E	10	Copper	The Midway Skarn includes two open cuts, one 50 ft. long and the other 200 ft. long trending N70W along contact between limestone and quartz monzonite. Along the contact between the limestone, which has been bleached, and the quartz monzonite is a epidote-garnet skarn that contains blocks of marble. The mineralization consists of less than 1 percent malachite, azurite, chalcopyrite and pyrite with magnetite, epidote, garnet, clay, hematite, and limonite.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
44	Nev-Cal Copper No. 1	7S	39E	10	Copper	Workings consist of a 200 ft. long open cut that reveals copper oxides (malachite and azurite) staining fracture surfaces in a 2 to 5 ft. wide zone striking N10°W in quartz monzonite. Secondary copper minerals appear to be derived from small, scattered blebs of chalcopyrite within granitics.	
45	Nev-Cal Copper No. 1	7S	39E	10, 14, 15	Tungsten, Copper	One 100+ ft. deep shaft sunk on calc-silicate contact zone trending N60°W and near vertical dip. Scattered rocks on dump reveal garnetiferous tactite with minor secondary copper developed along fracture surfaces. Shaft is probably early 1900's although refiled in 1972.	
46	Nev-Cal Copper No. 1	7S	39E	19	Tungsten, Copper	Two small slumped pits on calc-silicate zone 1 to 2 ft. wide striking N60°W. Minor secondary copper on fracture surfaces.	
47	Joker No. 77	7S	39E	14 (projected)	Tungsten, Copper	Caved adit( ) bearing N80°E on contact between felsic granitic and small metamorphic septa. Dump material reveals garnetiferous skarn with associated minor pyrite cubes evident. Adit bearing S10°W 100 ft.+ in length intersected metamorphic contact zone striking N60°W dump material reveals garnetiferous skarn with minor secondary copper (malachite and chrysocolla) on fracture surfaces. Collapsed ore chute below adit; production unknown.	
48	Joker No. 70	7S	39E	13 (projected)	Gold, Tungsten	Workings consist of three shallow pits and one caved shaft w/open cut that explored irregular contact zone between calcareous metasediments and quartz monzonite. Minor copper staining present at pits and shaft in conjuction with well developed iron oxide zone. Shaft probably pre-dates 1900's and was probably developed for gold values within hematite rich zone.	
51	Copper Canyon (Kunkel) Claim	7S	39E	24 (projected)	Gold, Copper	Workings include an adit bearing N40°W, at least 50 ft. long and several shallow dozer cuts. Adit collared along a N15°W trending shear zone that dips 55°SW in quartz monzonite. Minor pyrite cubes present, and fracture surfaces have been coated with FeO. Isolated minor coatings of chyrsocolla visible on some dump material. Selected sampling revealed .11 oz. silver per ton and .007 oz. gold per ton. It appears property has been drilled as several holes with stuck drill rod are in evidence along the canyon floor.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
57	C a M No. 4	7S	40E	30 S 1/2	Copper	The C a M claims consists of four vertical or inclined shafts along the contact between limestone in the Wyman Formation and the Beer Creek Quartz Monzonite. The shafts explore a 3 to 5 ft-thick skarn that has developed on the boundary between limestone and quartz monzonite and adjacent to dikes of quartz monzonite that intrude the limestone. The skarn contains epidote, garnet, calcite, chlorite, sericite, hematite, malachite, azurite, chrysoclla, galena and pyrrhotite. The quartz monzonite adjacent to the contact is bleached and altered and contains secondary biotite and chlorite. The workings appear to be late 1800's possibly, and there are no production records for the claims.	
58	Alum Canyon Prospect	8S	40E	5 SW 1/4 (projected)	Tungsten	Series of shallow dozer cuts along contact zone between crystalline limestone and quartz monzonite minor Fe staining developed along zone but no visible skarn assemblage present.	
Victor Consolidated-Scheelite Prospect Area, MRZ-3a(s-3)							
67	Victor Consolidated	8S	37E	10 S 1/2	Copper, Gold( )	The Victor Consolidated includes one partly collapsed adit and one open adit 100+ ft. long trending S60E at the contact between Lead Gulch Formation (calcsilicate hornfels and marble) and quartz monzonite. Mineralization is copper and gold in a magnetite-garnet-epidote skarn. The ore minerals are copper oxides, quartz and hematite. The mine is reported to have opened as a gold and copper mine in 1909, patented in 1912 and later operated as a talc mine (McHugh and others, 1984).	McHugh and others, 1984, p. 13; Wrucke and others, 1984, p. 3; Tucker, 1938, p. 480
68	Victor No. 8	8S	37E	10 SE 1/4	Gold( )	The Victor No. 8 includes one open untimbered adit trending N70W for approximately 60 to 80 ft. in Monola Formation (siltstone and limestone). The adit appears to follow transported hematite.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
72	Rainbow Mine	8S	36E	14 SW 1/4	Copper, Gold	Workings comprise an old, pinyon pine timbered 40 ft. deep shaft and a shallow open pit. Pit develops a quartz vein striking N5°E with vertical dip which contains blebs and veinlets of chalcopyrite and galena with secondary copper minerals along fracture surfaces. Shaft has been sunk on contact between quartz monzonite and crystalline limestone that strikes N65°W and dips vertically. Contact zone appears to be 1 to 2 ft. wide and shows development of a minor skarn zone with typical mineral assemblage of garnet, epidote, magnetite, and secondary copper oxides. Small quartz vein coincident with tactite zone containing minor pyrite and showing evidence of resilicification.	
73	Unknown	8S	36E	14 SE 1/4	Tungsten	This prospect consists of an open cut 20 ft. high by 10 ft. long by 8 ft. wide trending N80W with some timbering, which was worked in the early 1940's for scheelite. The cut exposes the contact between monzonite and limestone where a 3 ft. wide zone of skarn has formed. The mineralization consists of scheelite, garnet, epidote, hematite after pyrite, and clay in a N70W zone of altered limestone, skarn, and endoskarn which is between 13 ft. and 20 ft. wide.	
74	CBU Mine	8S	36E	24 NE 1/4	Tungsten	The CBM mine is an open cut 10 ft. wide in a shale crush zone between Joshua Flat monzonite and limestone. The mineralization consists of white clay and epidote.	
75	Scheelite Group	8S	37E	19 NW 1/4	Tungsten, Copper	Prospect is developed by a 20 ft. long adit driven in the footwall of 8 to 10 ft. wide tactite zone that formed along the contact between quartz monzonite and crystalline limestone. Tactite zone strikes N70°W, dip rolls from 60°W to near vertical. Tactite zone contains typical skarn mineralization - massive pyrope garnet, epidote, calcite, magnetite and probably minor chalcopyrite as secondary copper staining is present. Reference made to 400 lbs. of 40 percent WO_3 ore produced in 1906.	Waring and Huguenin, 1915, p. 131

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Big Dodd-Little Dodd Spring Area, MRZ-3a(s-4)							
170	Blue Jay (Jarosite) Mine	14S	40E	27 (projected)	Copper, Molybdenum	Workings consist of a 100 ft. long adit with winze, several short adits and at least 14 drill holes (up to a depth of 544 ft.) that aggregate 3,800 ft. Garnet skarn has developed along a contact between quartz monzonite and Devonian carbonate rocks and contains molybdenite, chalcopyrite, and secondary copper minerals. The skarn body extends for at least 1,100 ft. along a northerly strike; it is 70 to 260 ft. wide and reaches a depth of 450 ft. in places. Samples from holes drilled in 1971 by M.S. and W. Resources (records on file with National Park Service, Death Valley National Monument) suggest a 29 ft-thick, 590 ft. long mineralized zone that averages 1.05 percent copper and 0.12 percent molybdenum. Production unknown, but twenty tons of ore mined in 1915 yielded 4,000 lbs. of copper and 1,199 oz. silver.	Report of State Mineralogist 4, XV, p. 71; XXII, 463; XXXIV Map; Bulletin 23, p. 248; Bulletin 50, p. 306; National Parks Service, 1979; Wrucke, 1984, p. 24
171	Bonanza Prospect (Hesson Clipper)	15S	40E	10 SE 1/4 (projected)	Copper, Gold, Silver, Tungsten, Uranium	Major workings consisted of a 65 ft. long adit and 35 ft. deep shaft (McAllister, 1955) which have been obliterated by an open pit 50 ft. long, 30 ft. wide and 40 ft. deep. A 2 to 5 ft. wide, northerly-trending, quartz-filled shear zone is exposed at the surface of the pit and is heavily stained with secondary copper (malachite and chrysocolla) and iron oxide (limonite). Shear zone rapidly diminishes with depth and could not be traced along strike beyond the pit. Prospect occurs on a narrow septum of metamorphosed Paleozoic carbonate rocks enclosed by Mesozoic granitic rocks. The septum is highly fractured and sheared and contains elongated, narrow zones of garnet-rich tactite. Malachite, chrysocolla, and minor azurite occur sporadically as fracture surface coatings and as disseminations in tactite and quartz-filled shear zones as revealed in ten small pits north and south of the main pit. Twenty-three samples were taken by the USBM: Five chip samples of quartz at the main pit contained 0.009 to 0.426 oz. silver per ton and 0.034 to 3.40 percent copper. Three chip ship samples from the main pit had gold (0.0012 to 0.0774 oz. per ton), and two contained 0.0008 and 0.0021 percent WO_3. Another sample contained 0.134 oz. gold per ton and 1.140 oz. silver per ton, and 11.0 percent copper. Of the remaining seven-teen samples each had silver (0.00292-0.0875 oz. per ton); eleven had gold (0.000583-0.0169 oz. per ton); seven contained copper (0.720-2.00 percent); three had WO_3 (0.0005-0.0012 percent); and four had uranium oxide (0.0013-0.0057 percent U_3O_8) (Rumsey, 1984).	Norman and Stewart, 1951, p. 141; McAllister, 1955, p. 48; Rumsey, 1984, p. 7-8

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
172	Lead King Group (Lippincott)	15S	40E	24 NE 1/4 (projected)	Lead, Silver, Copper, Molybdenum	Discussion only includes mineral occurrences south of Death Valley National Monument, which contains two adits (17 to 35 ft. long) and 10 prospect pits. USBM took twenty-six samples of skarn zone, generally less than 10 ft-thick, and adjoining quartz monzonite and marble. Best values were in skarn: 0.0335 oz. gold per ton, 1.41 oz. silver per ton, 5.15 percent copper, 4.40 percent zinc, 0.054 percent molybdenum, 0.02 percent tungsten trioxide. Only one sample had more than 0.004 oz. gold per ton; eight had more than 0.1 oz. silver per ton; nine had more than 0.50 percent copper; four had detectable zinc (three exceeded 2 percent); four had detectable molybdenum; and three had detectable tungsten (one sample of altered quartz monzonite had 0.14 percent tungsten trioxide) and contain only isolated blebs of sulfides (chalcopyrite). Of fourteen USBM samples: eleven had traces of silver and one had 0.59 oz. silver per ton; five of eight tested had 0.26 to 2.65 percent copper; and four of ten tested had 0.04 to 0.60 percent WO_3 (tungsten).	Causey and others, 1983, p. 14; McAllister, 1955, p. 29
173	Hidden Ledge Prospect	15S	41E	19 NW 1/4 (projected)	Copper, Lead, Silver	A shallow, daylighted 8 to 10 ft. long adit and two shallow prospect pits along a 4 to 5 ft. wide, iron-stained shear zone that strikes due north and dips 60°W that occurs within quartzite and dolomite. Minor copper staining is associated with the shear. Out of ten USBM samples: The maximum values were 0.05 oz. gold per ton, 0.16 oz. silver per ton, 0.54 percent copper and 0.02 percent lead. Five other samples had more than 0.01 oz. silver per ton, and one had more than 0.1 percent copper.	Causey and others, 1984, p. 14
174	Unknown	15S	40E	24 SE 1/4 (projected)	Silver	One shallow prospect pit is on a 2 ft-thick manganiferous shear zone along contact between quartz monzonite and marble. One USBM sample contained 3.10 percent manganese and 0.0009 oz. gold per ton and 0.044 oz. silver per ton.	Causey and others, 1983, p. 13
175	Green Light Prospect	15S	40E	31 NE 1/4 (projected)	Silver	Prospect consists of one 28 ft. long adit on contact between quartz monzonite and marble. Four USBM samples contained from 0.015 to 0.02 oz. silver per ton.	Causey, 1983, p. 13

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
176	Windy Hill Prospect	15S	40E	31 SE 1/4 (projected)	Silver	One shallow prospect pit in quartz monzonite. Two USBM samples contained 0.009 and 0.015 oz. silver per ton.	Causey and others, 1983, p. 13
177	Sunshine Prospect	15S	40E	31 SE 1/4 (projected)	Silver, Lead, Tungsten	Two small prospect pits along a 4 ft. wide skarn zone developed between quartz monzonite and limestone-marble. Ten USBM samples: nine contained detectable copper (three had 0.31 to 1.70 percent); highest values were 0.02 percent lead, 0.125 percent molybdenum, 0.01 percent WO_3, 0.54 oz. silver per ton, and 0.034 oz. gold per ton.	Causey and others, 1983, p. 13
178	Cupro Tungstite Prospect	15S	41E	30 (projected)	Copper, Tungsten, Silver, Gold	Prospect consists of a 20 ft. long, 10 ft. deep slot cut along a small lens of skarn within a metamorphosed limestone (marble) bearing S50°E. Tactite zone appears 1 to 3 ft. wide, and fracture surfaces are coated with secondary copper mineralization, principally malachite and azurite with minor chrysocolla, small disseminated veinlets containing cupro tungstite on lower right side of cut face. One USBM sample: 9.20 percent copper, 0.23 percent WO_3, 1.55 oz. silver per ton and 0.115 oz. gold per ton.	Warning and Huguenin, 1919, p. 131; Partridge, 1941, p. 310; McAllister, 1955, p. 51, 55; Causey and others, 1984, p. 13
179	Sal (Bee Em Tee) Group	15S	40E	36 SW 1/4 (projected)	Copper, Silver, Gold, Tungsten	Workings consists of a series of mine prospect pits on scattered skarn pods near and along the contact between monzonite-syenite and limestone-marble. The largest pod is about 25 ft. long, 15 ft. wide, and at least 13 ft. thick. Thirteen USBM samples; four had 0.001 to 0.018 oz. gold per ton; three had 1.25, 25.8, and 34.0 oz. silver per ton. Eight samples analyzed for copper: four had 0.42 to 2.20 percent. Three samples analyzed for tungsten; two had 0.59 and 0.01 percent WO_3. No significant lead or zinc values were detected.	Causey and others, 1983, p. 12

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
180	Shirley Ann (Eureka)	16S	40E	1 (projected)	Copper, Silver, Lead, Gold, Tungsten, Molybdenum	Workings consist of a series of eight short adits (10 to 100 ft. long), one 35 ft. deep shaft, and ten prospect pits that developed lead and copper bearing quartz veins contained within a metamorphosed limestone septum that has formed adjacent to the quartz monzonite contact. Veins strike N45 to 50°E and dip 40 to 70°E, and mineralization is irregular in distribution along trend and consists of galena and cerussite occurring in quartz and calcite gangue. Early mining was probably for copper, as chalcocite and chalcopyrite are present, and veins are stained with secondary copper minerals. USBM thirty-six samples: one had detectable gold (0.002 oz. per ton), nine had 1.20 to 17.1 oz. silver per ton, the rest had less than 0.67 oz. silver per ton. Nineteen samples analyzed for copper: three had 0.46 to 1.50 percent copper. Twenty-six analyzed for lead: thirteen had 0.50 to 7.80 percent. Seventeen analyzed the molybdenum: Seven had 0.01 percent. Six analyzed for tungsten trioxide: one contained 0.01 percent.	Aubury, 1902, p. 246; McAllister, 1955, p. 33, 43; Causey and others, 1984, p. 12
181	Navajo Chief Prospect	16S	40E	1 NW 1/4 (projected)	Copper, Lead, Silver, Gold	Workings consist of two adits (210 and 50 ft. long) and seven prospect pits along discontinuous skarn zones that have developed within and/or adjacent to the contact between a lenticular septa of Paleozoic carbonate rock and quartz monzonite. Skarn contains chalcocite, chalcopyrite, limonite after pyrite and secondary copper minerals. USBM took twenty-seven samples: Of ten samples analyzed for copper, five had 0.015 to 0.56 percent copper and two others had 0.93 and 2.90 percent. Fourteen were tested for tungsten, but WO_3 was detected (0.01 percent) in only one sample. Traces of lead (0.01 percent) were found in four of seven samples tested. Small amounts of gold (maximum 0.013 oz. per ton in one sample) and silver (as much as 0.50 oz. per ton in one sample) were found in seven and twenty-one samples, respectively.	Aubury, 1902, p. 245-246; McAllister, 1955, p. 49; Causey and others, 1984, p. 11

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
182	Jack Rabbit Prospect	16S	40E	1 SE 1/4 (projected)	Copper, Tungsten	One shallow prospect pit on a small lenticular skarn pod contained within quartz monzonite. Two USBM samples contained 0.29 and 0.134 percent copper and negligible gold, silver, zinc, and tungsten.	McAllister, 1955, p. 49; Causey and others, 1984, p. 11
183	Tungsaline Prospect (Twin Sisters)	15S	41E	19 NW 1/4 (projected)	Silver, Copper, Tungsten	A series of six shallow prospect pits have been developed along quartz veins and calc-silicate zones within a lenticular septa of metasedimentary roof pendant rocks. Quartz veins are massive, bull quartz up to 3 ft. in width, lengths of several hundreds of feet, and contains only isolated bleds of sulfides (chalcopyrite). Of fourteen USBM samples: eleven had traces of silver and one had 0.95 oz. silver per ton; five of eight tested had 0.26 to 2.65 percent copper; and four of ten tested had 0.04 to 0.60 percent WO_3.	Aubury, 1902, p. 245; McAllister, 1955, p. 49; Causey and others, 1984, p. 11
189	Palmer Prospect	15S	41E	20 SE 1/4	Copper	The workings consists of two small adits and numerous prospect pits in epidote-garnet skarn and limestone. The skarn zone is located between Hunter Mountain Quartz Monzonite and Lost Burro Formation. The zone varies from 100 to 400 ft. wide and contains epidote, garnet, malachite, azurite, chrysocolla, chalcopyrite, massive hematite, quartz, blue calcite, and wollastonite. No production is reported.	
Coyote-Black Rock Prospect Area, MRZ-3a(s-5)							
116	Black Rock Prospect	7S	37E	27 NE 1/4	Copper, Gold, Silver	Workings include three adits, each less than 10 ft. long and three small pits. Small, isolated roof pendants of hornfels and marble in a diorite body. Skarn zones in the pendants contain chrysocolla, malachite, hematite, and sparse chalcopyrite. Six USBM samples averaged 1.6 percent copper, three contained 0.3 to 2.4 oz. silver per ton, and two contained 0.016 and 0.020 oz. gold per ton.	Wrucke and others, 1984, p. 18
120	Coyote (Mystery, Rainbow)	9S	37E	31 SE 1/4	Gold, Copper, Tungsten	Prospect has been developed by shallow dozer cuts and pits along contact between Joshua Flat pluton and crystalline limestone. Upper cut is on a small xenolith of limestone that, in part, has been silicified along a N50°W zone. One to 3 ft. wide zone shows development of marble with diopside, wollastonite, garnet and epidote, small 4 ft. deep pit on 1 ft. wide FeO stained shears in limestone that strike N20°E and dips 70°NW. Small 1 in. wide zone within shear shows small blebs of chalcopyrite with associated copper staining. Two of five USBM samples contained gold, 0.006 and 0.192 oz. gold per ton; one	Wrucke and others, 1984, p. 18

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Anton and Pobst Mine Area, MRZ-3a(s-6)							
194	Anton a Pobst Mine (Birdspring Garnet)	16S	40E	6 (projected)	Copper	According to McAllister, underground workings, including a 40 ft. long adit, are about 100 ft. long in irregularly copper stained marble and epidotized rock developed along the contact with quartz monzonite. The mine is reported to have produced 400 tons of ore in 1916 that contained 82,000 lbs. of copper.	Aubury, 1905, p. 248; Aubury, 1908, p. 306; Eric, 1948, p. 238; Tucker, 1938; Waring, 1919, p. 71; McAllister, 1955, p. 50
Waucoba Tungsten Mine Area, MRZ-3a(s-7)							
150	Waucoba Tungsten Mine	11S	37E	21 SW 1/4	Tungsten, Copper	Property consists of two inclined shafts, one being at least 168 ft. deep and inclined at 55°NE. Incline developed scheelite that occurred as parallel bands in argillite interbedded with limestone and underlain by quartzite. Ore bodies are small, irregular, and discontinuous, and both the ore and the county rock are highly fractured. Granodiorite, not exposed underground, outcrops north and west of the shaft, and was probably the source of the ore-forming fluids (Norman and Stewart, 1951). Property was worked from 1939 to 1942, and although production figures are not available mill heads averaged 1 to 2 percent WO_3. The other incline has been sunk on a massive, highly fractured quartz vein that strikes N50°E and dips 70°E. Quartz carries copper silicates and carbonates and is said to have carried $2.00 per ton gold. (Tucker and Sampson, 1938)	Tucker and Sampson, 1938, p. 467; Partridge, 1941, p. 313; Norman and Stewart, 1951, p. 96
151	Buckwheat No. 1-5	11S	37E	29 NE 1/4	Tungsten	Workings consist of two open pits, 5 to 10 ft. deep, and several shallow 1 to 3 ft. deep prospect pits. Uppermost pits has been sunk on a 2 in. wide garnetiferous zone that strikes due north and dips 50°E. Garnetiferous zone has developed between a quartzite and dolomitic limestone, and contains calcite, epidote, mica, minor pyrite (limonite) and scattered coatings of copper silicate (chrysocolla). Lowermost pit has been developed on an iron-rich, 3 to 5 ft. wide lenticular shaped gossan within dolomitic limestone that strikes due north and dips 45°E. Gossan zone shows minor evidence of silification, isolated fracture coatings of chrysocolla.	Tucker and Sampson, 1938, p. 467

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Mary V - Indian Prospect Area, MRZ-3a(s-8)							
169	Lucky Rich Prospect	13S	39E	12 NE 1/4	Copper	Three small pods of garnetiferous skarn occur over a distance of 1,000 ft. along contacts of Quartz Monzonite of Hunter Mountain with limestone of the Pogonip Group. Of six USBM skarn samples, three contained traces of silver, two had 0.01 and 0.08 percent copper, one had 0.01 percent zinc, and traces of molybdenum.	McHugh and others, 1984
270	Indian Prospect	13S	40E	32	Silver, Lead, Tungsten	Development consists of one shallow pit on a 10 ft-thick skarn zone that is exposed for 100 ft. along a limestone-quartz monzonite contact. USBM sampled ore deposit in veins in sheared, sericitized granitic rock near the contact with hornfels and marble. Reportably the ore consisted of coarse-grained galena, which contains some silver, in a gangue of quartz. Galena, in part, has been altered to cerrusite. Minor secondary copper minerals present, probably from alteration of chalcopyrite, ore carried $12-25 per ton value, chiefly in silver.	Wrucke and others, 1984, p. 24
271	Mary V. Prospect	14S	40E	5	Copper	Development consists of one shallow pit on a limonite epidotized shear zone in Birdspring Formation limestone near the Hunter Mountain Quartz Monzonite containing sulfur, malachite, wollastonite, and chrysocolla. Ten USBM samples contained trace amounts of silver, of these three samples had 0.01 to 0.12 percent copper.	Wrucke and others, 1984, p. 24
Dry Mountain Area, MRZ-3b(s-1)						See property description.	
Marble Canyon Gold Placers, MRZ-3a(p-1)							
121	Marble Canyon Placers (Bedell Group, Davis Group, Hallelujah No. 3, Iron Nugget, Krater-Van Norman Group, Lewis Group and Anderson)	10S	37E	7, 8, 9, 10	Gold	These gold placer deposits occur along Marble Canyon for a length of approximately nine miles. Channel width is about 200 ft. and the general course is east-west. The gravel is well rounded and is composed of quartzite, granite, and quartz. The gold occurs on bedrock, which is limestone and schist, and is fairly coarse in size, ranging from the size of wheat grains to nuggets. Development consisted of eighteen shafts sunk to bedrock with depths ranging from 70 to 150 ft. with drifts and crosscuts within the pay zone totaling at least 3,000 ft. Production was mostly unrecorded, but at least 329 oz. gold and 22 oz. silver were recovered from more than 7,300 cubic yards of gravel mined between 1936 and 1960. Mined gravel averaged $1-7 per cubic yard at a reported value of $300.	Tucker and Sampson, 1938, 411; Norman and Stewart, p. 156; Wrucke, 1984, p. 19, 29; McHugh, 1984, p. 33

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Beveridge Canyon Gold Placers, MRZ-3a(p-2)							
		14S	37E	23	Gold	The U.S. Bureau of Mines identified 320,000 cubic yards of alluvium in upper Beveridge Canyon as containing placer gold. There is no record of placer gold production from these deposits. USBM sampling revealed gold in amounts of between $0.07 to $0.19 per cubic yard (at a gold price of $425 per ounce).	Close, 1985, p. 57
Oriental Wash - Tule Canyon Placer Deposits, MRZ-3a(p-3)							
		8S	41E	4,5,8,9		Alluvial fan deposits in the Oriental and Tule Canyon drainages were sampled by the USBM for placer gold. Of 40 bulk panned concentrate samples, twelve scattered throughout the Western area were found to contain detectable gold averaging $0.068 gold per cubic yard (at a gold price of $425 per ounce).	Wrucke, 1984, p. 8
Northern Eureka Valley Placers, MRZ-3b(p-1)							
32	Eureka Silver No. 1-5	6S	37E	34 NE 1/4	Gold	Series of shallow dozer cuts and numerous 8 to 12 ft. deep backhoe trenches that prospect an alluvial fan composed of residual quartzite and schist pebble conglomerate.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Crater Sulfur Mine Area, MRZ-2a(Sulfur-1)							
96	Crater Mine	8S	39E	33 NE 1/4 34 NW 1/4	Sulfur	The Crater mine is a 600 ft. x 450 ft. x 40 ft. deep northeast trending open pit with a collapsed shaft at the southern end. Discovered in 1915, the property was brought into production in 1928 and was operated intermittently by numerous lease holders until 1969 with peak activity occurring between 1928 and 1943. It is reported that 62,000 tons of sulfur were mined and that an additional 3 million tons of demonstrated resources averaging 40 percent sulfur are reported (McHugh and others, 1984). The mines at Crater are in large zones of sulfur-gypsum sinter that have replaced Carrara limestone and Bonanza King dolomite. These zones are centered along major northeast and north-south-trending faults and appear to have been the locus for the hot spring activity (Erickson and others, 1985).	Tucker and Sampson, 1938, p. 487-492; Lynton, 1938, p. 563-590; Norman and Stewart, 1951; Lydon, 1957, p. 613-622; Stinson, 1984, p. 9; Erickson and others, 1985; McHugh and others, 1984, p. 31; Wrucke and others, 1984, p. 4, 14
96A	Crater No. 1	8S	39E	33 E 1/2	Sulfur	The Crater No. 1 includes an open cut 40 ft. high by 30 ft. wide by 600 ft. long, which trends north-south, and numerous exploration pits and prospects. The host rock is highly fractured brown to tan dolomite and limestone interbedded with black dolomite and brown to tan shale. Mineralization consists of sulfur, gypsum, clay, and quartz that fills fractures and replaces the dolomite. Hydrothermal fluids have bleached and altered the dolomite within the mine area.	Lynton, 1938, p. 563-590
97	Fraction and Southwest Sulphur Group	8S	39E	33, 34	Sulfur	This group of claims were worked by the Italio Sulfur Industries Inc. in the late 1930's. Sulfur ore occurs in fractured dolomite the ore carries 7 to 85 percent sulfur. Ore was recovered from a number of shafts, drifts, and open cuts and refined on the property. Production from this operation is unknown.	Tucker and Sampson, 1938, p. 487-492; Stinson, 1984, p. 9
98	Gulch Group	8S	39E	33 SE 1/4 34 SW 1/4	Sulfur	The Gulch No. 1 mine includes an open cut 10 to 20 ft. deep x 25 ft. across trending N60E. The cut exposes a breccia zone in dolomite and quartzite that contains sulfur, gypsum, quartz with some possible cinnabar. The balance of the Gulch Group consists of short adits, shallow shafts, and open cuts. Sulfur occurs in pure, crystalline form intermixed with a kaolinized material in limestone, gypsum, and cherty shales. Three parallel seams of sulfur with a north-south strike and 40°W dip, occur in the limestone. The sulfur seams vary in thickness from 10 to 20 ft. Production from the Gulch	Tucker and Sampson, 1938, Simpson, 1984, p. 9; Lynton, 1938, p. 566

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
99	Soliz a Vaseta (Sulphuro No. 4)	8S	39E	33 SE 1/4	Sulfur	The mine includes a partially collapsed 1 1/2 compartment shaft and an open cut 150 ft. wide by 200 ft. long by 15 ft. deep along with numerous exploration pits. The mineralization consists of sulfur, gypsum, and pyrite in north-south trending zone of fractured and silicified gray to wite dolomite.	Lynton, 1938, p. 566
100	Unknown	8S	39E		Sulphur	The mine consists of a 7 ft. long S40W trending adit and three 10 x 20 ft. prospect pits in sandstone, limestone, and shale. The mineralization is in a 20 ft. wide zone that strikes N30E, dips near vertical, and consists of sulfur, hematite, clay, and chalcedony. The sulfur occurs as coatings and 1 in. thick fracture fillings in the zone.	
White Eagle Talc Mine, MRZ-2a(Talc-2)							
158	White Eagle Mine	13S	37E	3	Talc	The mine is currently producing about 3,000 tons per year of white talc which is used as a paint extender, in cosmetics, and in pharmaceutical applications. The White Eagle is mined by sub-level caving operations from two southwest trending adits and one crosscut. The mine first started operations in 1941 and has operated periodically since that time. The mine is in a series of generally north-south striking and west dipping beds of white to gray dolomitic marble and white quartzite that has been intruded by medium grained, gray quartz monzonite of the Pat Keyes pluton. The intrusion of the pluton has hydrothermally altered all three of the rock types and formed an irregular shaped talc ore body that generally trends northwest. The talc ore body contains no tremolite, but does contain up to 17 percent feldspar and blocks of unaltered dolomite and quartz monzonite.	McHugh and others, 1984, p. 15; Page, 1951, p. 33-35

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
MRZ-2b(Na,Bo-1)							
163	Saline Valley Borax	14S	38E	22	Borax Sodium Salts	According to Gale (1912), borax was recovered during the period 1895 to 1907 by collecting salt crust from certain areas of the playa and dissolving this material in tanks of hot water. Amount of production is unknown.	Gale, 1914, p. 416-421
164	Saline Valley Salt	14S	38E	26	Sodium	Discovered in 1864, the salt deposit in Saline Valley was first worked in 1903 and 1904. In 1913 construction of a 13 1/2 mile long aerial tramway was completed to transport salt from Saline Valley to the railhead in Owen Valley at Swansea. Built between 1911 and 1913 at a cost of $300,000, it was operated intermittently until 1930. The tram carried about 30,000 tons of salt from deposits in Saline Valley to Owens Valley during the seventeen years it operated. The 13 1/2 mile long aerial tram had 268 12 $ft.^3$ buckets on a 2 in. diameter wire rope and was driven by electric motors. It had a capacity of twenty tons per hour and had steeper grades than any other tram in the United States. The buckets weighed 800 lbs. and held about 700 lbs. of salt. The tram and salt works operated between April and October every year and could dispatch fifty-six buckets per hour. The buckets ran through four control stations between the two terminals all of which were connected by telephone. Much of the equipment used to construct aerial trams at mines in the area was salvaged from the salt tram after operations ceased.	Hank, 1882; Gale, 1914, p. 416-421; Tucker, 1926; Ver Planck, 1957, p. 117; Lombardi, 1964
MRZ-2b(Na,K-2)							
70A	Deep Springs Lake Potash (Inyo Chemical Company)	7S	36E	4, 5, 8, 9	Sodium Potassium	About 1920 Deep Springs Lake was prospected by the Inyo Chemical Company for sodium and potassium salts. After drilling some holes and constructing some levees further analytical work did not encourage development. No production recorded.	Gale, 1912, p. 420; Tucker, 1921, p. 296; Tucker, 1926, p. 526; Tucker and Sampson, 1938, p. 497

MINE NO.	NAME	LOCATION T.	LOCATION R.	LOCATION SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
J.O. Mine Area, MRZ-2b(Wollastonite-3)							
188	J.O. Mine (Calmet Group)	15S	41E	20 (projected)	Wollastonite	Wollastonite mineralization has developed in altered skarn zones along the contact between limestones of the Paleozoic Tin Mountain and Lost Burro Formations and the Cretaceous Hunter Mountain Quartz Monzonite. The mineralization consists of white to cream colored, silky, fiberous crystals of wollastonite averaging about 1 cm. long in carbonate rock. The deposit contains small lenses and pods of chert and blue to blue-gray calcite along with occasional 2 mm by 4 mm pods of epidote. The wollastonite occurs in a north-dipping contact zone 300 ft. to over 1,000 ft. wide and can be traced almost 5 miles in a southeasterly direction. Based on prospect pits and eighteen drill holes Clark (1980) estimated the reserves on the west-end of the deposit to range upward to 25 million tons. At the east end of the deposit about 10,000 tons of ore were mined in the 1960's, and it is estimated that 1,000,000 tons are readily accessible here. This mine at the east end of the deposit is within the Death Valley Monument and has not operated since the 1960's. Clark estimates that overall this deposit may contain over 200 million tons of wollastonite ore.	Clark, 1980, p. 294-298

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
MRZ-2b(Talc-4)							
267	Florence Talc Mine	16S	38E	1	Talc	Four talc lenses occur along a 400 to 500 ft. wide zone of fracturing which strikes N60° to 80°W and dips 15° to 30°NE in dolomitic limestone. The fracture zone is crosscut by N10° to 20°W striking, 50° to 70°SW dipping fault zones. The lenses identified total 2,250 ft. in length and average 3.3 ft-thick. The largest talc bodies are where fractures and fault zones inter- sect. The talc is gradational and contains pods of silicified calcareous rock. Eleven adits totaling 500 ft., five benches totaling 1,500 ft., and several small pits are scattered for 4,700 ft. along the zone of fracturing. About 8,000 tons of talc were shipped. Based on forty-seven samples, the lenses are inferred to contain 250,000 tons of talc reserves.	Close, 1985, p. 50-51, 75; Norman and Stewart, 1951, p. 121
268	Bonnham (White Mountain) Talc Mine	15S 16S	38E 38E	35 1, 2	Talc	Page, 1951, reported that this deposit was known to Indians who sold talc to the Cerro Gordo Mine in the 1870's for use as a refractory in smelting. It was leased and mined in conjunction with the Florence Talc Mine from the 1930's until 1984. The deposit consists of three talc lenses in flinty, dolomitic limestone. The lenses are up to 5 1/2 ft-thick and 700 ft. in length. The talc is black to green, blocky, grades into the dolomite and contains pods of hard, siliceous-calcareous rock. The workings consists of two benches totaling 400 ft., 600 adits, all but one caved, and numerous pits and cuts, USBM has estimated that about 32,000 tons of talc reserves remain in two lenses that total 750 ft. in length and average about 2.4 ft-thick.	Page, 1951, p. 23; Norman and Stewart, 1951, p. 121; Close, 1985, p. 52-54
272	Holiday Talc	16S	38E	1	Talc	First worked in 1942 during World War II, this mine has produced over 50,000 tons of talc primarily during the late 1960's and early 1970's. The mineralization consists of a white to dark gray, fine-grained talc that near contacts becomes gritty with quartz and calcite. The 50 to 100 ft. wide ore body trends N5W to N40W and dips 70E. It is in contact with white to tan fine-grained quartzite and dark dolomite with some clay, feldspar and iron staining.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
MRZ-2b(Talc-5)							
159	Grey Eagle (Eleanor)	13S	37E	10	Talc	This mine started operating in 1942 and has produced talc off and on since then. The workings consist of four adits which trend southwest, on two levels and an area of collapsed talc where the underground workings were stoped to the surface. The talc occurs in a 30 ft-thick alteration zone between light-colored quartzite and dolomite that strikes N60W and dps 60SW. The talc also contains pods of unaltered dolomite.	Page, 1951, p. 35
160	Dorris Dee Talc Mine	13S	37E	14 NW 1/4	Talc	Workings consist of three adits that total about 380 ft. and an 80 ft. open cut. Talc was moved via a slusher and wireline tram to an ore car which in turn was tracked to an ore chute or 12 ft. diameter pipe which delivered the talc to an ore bin at the bottom of the hill. The talc was produced from three lenses along two northwest-trending fault zones that dip 70° to 75°SW and transect massive dolomitic marble. The lenses average about 30 ft-thick and have a total length of about 270 ft. The talc in the lenses is white to green, blocky to fine-grained, non-steatite to steatite grade, typically grades into te wallrock, and contains pods of hard, siliceous rock. According to the USBM, about 320 tons of talc were produced in 1960-1961. Based on nineteen samples, about 20,000 tons of talc ore are inferred that can be mined in conjunction with nearby deposits.	Close, 1985, p. 55-56, 75
162	Snowflake Talc Mine	14S	38E	18	Talc	Four irregular, curvilinear talc lenses follow fractured contact zones between cherty dolomitic limestone and quartz diorite. The lenses total about 2,000 ft. in length, average 5 ft-thick, and are composed of green-to-white, blocky talc that grades outward into impure talc-schist stringers. Pods of hard, calcareous-siliceous rock are included in the talc. The mine was discovered in 1890's and has worked intermittently since that time. There are two groups of workings 1,300 ft. apart. At the east group is a 370 ft. tunnel with stopes, a 100 ft. caved adit, a number of small pits and cuts, and an ore bin. At the west group is a 80 ft. adit, three pits, several small pits and cuts, and dismantled slusher. It is estimated that 5,000 tons of steatite talc were hand cobbed and shipped. The four talc lenses are inferred to contain about 340,000 tons with additional talc likely.	Close, 1985, p. 47-49, 85

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Eastern Inyo Mountains Talc Area, MRZ-3a(Talc-1)							
157	Willow Creek Mine	13S	37E	(projected)	Talc	The talc is apparently on the edge of a pendant of white to cream colored limestone a white quartzite in quartz monzonite. The entire mine area, however, seems to be underlain by a landslide, and the mine workings are in highly fractured rock. Both the quartz monzonite and the limestone appear bleach along the contact with some epidote and red brown garnet developed. The talc body is poorly exposed but has a maximum thickness of about 20 feet. It thins markedly in both directions along strike and mining was largely a glory-hole operation with talc being trammed to the surface along two 150 ft. S25E trending adits. The total amount of talc produced was about 1,000 tons obtained mostly in the period 1941-42. The talc is white to light green with some chlorite and resembles the steatite grade talc mined elsewhere in the Inyo Mountains.	Norman and Stewart, 1951, p. 123; Page, 1951, p. 32

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Nicolaus - Eureka Talc Mine Area, MRZ-3a(Talc-2)							
69	Victor No. 1	8S	37E	15 N 1/2	Talc	The Victor No. 1 includes one timbered adit trending S80W for approximately 100 ft. and three untimbered adits trending S25 to 35W. These adits are all in a 5 to 7 ft-thick talc zone which strikes N25 to 30E and dips 80W. The talc zone is in sheared and altered limestone near the contact between Bonanza King Formation (dolomite), and Quartz Monzonite of Joshua Flat. The talc is light green in color and contains chlorite and talc along with limestone and dolomite. An 18 in. high metal chute extends from the mine 600 ft. down slope to the base of slope. This mine is reported to have been worked for talc after 1912. (McHugh and others, 1984)	McHugh and others, 1984, p. 13; Wrucke and others, 1984, p. 3
77	Nicolaus-Eureka	8S	37E	21 NE 1/4	Talc	Property has been extensively developed by a series of dozer cuts and benches along contact zone between white, crystalline limestone and Quartz Monzonite of Joshua Flat along a general trend of due west with a near vertical dip. Dark green steatite grade talc has developed to widths of 30 ft. from this contact. USBM records show a production of 75,000 tons of talc from property during the period 1945 to 1970.	Norman and Stewart, 1951, p. 119; Chidester and others, 1964; Wright, 1966, p. 414-420; Wrucke and others, 1984, p. 14
79	Unknown	8S	37E	29 NW 1/4	Talc	Prospect developed by several hundred feet of dozer cuts and benches along contact zone between limestone and fine grained mafic dikes. Extensive bleached zone associated with the prospect but actual talc formation appears to be limited to small 1 to 2 in. wide stringers of poor grade material. General trend of zone is due west and dips 70°S.	
80	Eureka Talc	9S	37E	29 NE 1/4	Talc	Workings consist of four open cuts along contact zone between a white coarsely crystalline limestone and quartz monzonite. Upper cuts along a 10 to 15 ft. wide zone of greenish-black talc that strikes S45°W with near vertical dip. Talc has formed adjacent to igneous-sedimentary contact and alteration rapidly diminishes into limestone. Talc is very dark and appears to be of poor quality - probably as a result of very localized and incomplete alteration along what appears to be a quartz monzonite dike and/or intrusive apophysis. Doubtful if property had any production.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
81	Harlis and Broady (D and D) Mine	8S	37E	29 NE 1/4	Talc	Property has been developed by one adit with 281 ft. of workings, one 10 ft. long adit and a 50 ft. long open cut. Talc and chlorite in pods has developed along sheared zones in limestone and quartzite near intrusive contact with Quartz Monzonite of Joshua Flat. Main adit is on a talc zone that strikes north and dips near vertical. No substantial talc bodies are exposed. USBM records show 31 tons of talc produced in 1957.	Wrucke and others, 1984, p. 81
82	Green Rock No. 1	8S	37E	29 SW 1/4	Talc	Several dozer cuts and small pits along sheared zones within limestone, siltstone, and quartzite near contacts with felsic intrusions. Talc zones strike S50°W with near vertical dip and show minor staining along some shears by secondary copper minerals. Main talc zone averages 5 to 6 ft. in width, light green color, but shows incomplete alteration. It is doubtful if any production from property.	Wrucke and others, 1984, p. 13
<u>Eureka Valley Playa Area, MRZ-3a(Li,U-3)</u>							
135	Lithium Occurrence	9S	39E	34	Lithium	Anomalous concentrations of lithium were detected in a hole drilled 335 ft. deep in the Eureka Valley playa in 1978. Samples taken from between 20 ft. to 220 ft. averaged 0.048 percent lithium with some zones as high as 0.095 percent lithium.	McHugh and others, 1984, p. 24,34; Wrucke and others, 1984, p. 13,14,21, 31, 33; Crowley, J.A., 1979
<u>Eureka Valley Sand Dunes, MRZ-3a(Silica-4)</u>							
136	Titan Placer	10S	39E	1, 12, 13	Sand	This claim includes the entire Eureka Valley sand dune complex which is 3 miles long, 4,000 ft. wide, and 600 ft. high. The Eureka Valley Dunes contain 300 million tons of eolian sand consisting of approximately equal amounts of quartz and feldspar with small amounts of mica, magnetite, hematite, calcite, amphibole and lithic fragments.	McHugh and others, 1984, p. 24; Wrucke and others, 1984, p. 14, 22
<u>Saline Valley Sand Dunes, MRZ-3a(Silica-5)</u>							
161	Saline Valley Sand Dunes	13S	38E	33,32, 34	Sand	Several square miles of dune sand composed principally of quartz feldspar with minor amounts of magnetite and other constituents exist along the northwestern side of Saline Valley. Dunes range from 50 to 120 ft. in height and comprise hundreds of millions of tons of potential silica resource. No production recorded.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
San Lucas Canyon, MRZ-3a(Wollastonite-6)							
		15S	39E	28	Wollastonite	Wollastonite at the quartz-monzonite contact of a 100 ft. zone of calc-sulicate rock, 1.6 miles N36°E of the Cerro Gordo Road Junction in San Lucas Canyon, is closely associated with garnet, epidote, calcite, quartz, chalcedony and stilbite.	McAllister, 1955, pg. 62
Saline Valley Pozzolan Area, MRZ-3a(Pz-7)							
168	Ostrenger Pozzolan (White Cliffs, Cerro-Albino Prospect)	11S	39E	3 S 1/2 10 N 1/2	Pozzolan	This prospect consists of numerous small exploration pits in Tertiary rhyolitic tuffs. The tuffs are white to tan in color and contain zeolites and trace amounts of mercury.	McHugh and others, 1984, p. 25
Northern Saline Valley Quartz Area, MRZ-3a(si-8)							
152	Saline Valley Quartz	11S	37E	28	Quartz	This prospect consists of numerous shallow prospect pits atop a steep ridge of Harkless Formation quartzite. The mineralization consists of 1 to 8 in. long euhedral quartz crystals that commonly contain fluid, stibnite, and pyrite with some smokey crystals. The most notable characteristic of the quartz crystals is that many have the rare extra faces which make them right and left handed quartz crystals. The crystals occur in clay filled fractures in the quartzite. These prospects have been worked on and off since 1973. Some of the crystals have been sold to mineral collectors.	
Walker Prospect Area, MRZ-3a(Talc-9)							
117	Walker Prospect	9S	36E	25 SE 1/4	Talc	Workings consist of a 350 ft. long, 20 ft. deep dozer cut and other shallow cuts along a metasedimentary zone which strikes N10°W and dips 55°E. Cut reveals a 10 to 12 ft. wide zone of light green, impure talc. Talc shows incomplete alteration, being both siliceous and dirty, and not of commercial grade. Talc occurs within a silty limestone and/or dirty quartzite.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
Oasis Pumice Area, MRZ-3a(Pumice-10)							
15	Oasis (Cornucopia) Pumice	6S	37E	8 S 1/2	Pumice	This mine consists of two small (30 x 30 ft.) open pits which were claimed in 1946 but are now idle. The pits contain white angular pumice and tuff along with sand sized quartz and feldspar grains. The deposit occurs as a small deposit overlying Beer Creek Quartz Monzonite.	Norman and Stewart, 1951, p. 109
MRZ-3a(Gypsum-11)						See property descriptions under MRZ-2b(h-4) and MRZ-2a(Sulfur-1).	
MRZ-3b(Na,K-1)							
MRZ-3b(Na,Li-2)							
Eureka-Saline Carbonate and Siliceous Rocks, MRZ-3a(li,si,-1,2)							
140	Unknown	8S	39E	11 NE 1/4	Mercury Limestone	One hundred foot long dozer cut on north side of ridge. Cut exposes greyish-white silified limestone that contains no evidence of sulfides. Cut is probably exploration performed on the possible north-eastern extension of the mineralized faults present at the El	
78	Lime Hill Limestone	8S	37E	20 SW 1/4	Limestone	This mine consists of a 135 ft. x 50 ft. open pit in dark-gray to white limestone and dolomite of the Bonanza King Formation. The mine operated in the late 1950's and the material was used primarily as roofing granules. The pit is in bleached and recrystallized dolomite, which strikes N30E and dips 35NW. It is estimated that about 5,000 tons of dolomite was mined at this site.	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
MRZ-4							
30	Unknown	6S	37E	27 SW 1/4		Workings consist of three shallow, parallel dozer trenches across a 15 to 20 ft. wide zone of bleached and altered white crystalline limestone, that contains small, FeO coated vugs. Aside from iron staining, no other mineralization obvious.	
55	Unknown	7S	37E	22 NE 1/4	Copper, Gold	Workings consist of one shallow 10 ft. deep pit and one 18 ft. deep shaft. Pit has developed a 4 ft. wide altered shear zone in crystalline limestone that strikes N10°E and dips 70°W. Zone shows evidence of resilicification and small pieces of Fe rich jasper with opaline coatings visible on the dump. Shaft is on a 2 to 3 ft. wide FeO stained shear zone that strikes due north and dips 70°W. Minor secondary copper minerals along fractures and limestone wall-rock adjacent to shear zone has been marblized.	
56	Unknown	7S	37E	30 SW 1/4	Gold	Prospect on two parallel, 6 to 10 in. wide pegmatitic quartz veins in quartz monzonite that strike N20°W and dip 60°E. Quartz veins contain large 2 to 3 in. crystals of plagioclase with scattered 1/4 to 1/2 in. wide mica books. Oxidation of mica has resulted in a downslope FeO halo on quartz monzonite. Aside from prospecting, there is no development.	
86	Uncle Adopf Prospect	8S	36E	35 SE 1/4	Gold	Series of open cuts and dozer trenches up to 15 ft. deep within a series of interbedded siltstones and quartzites that show very minor hematite staining along fracture surfaces. USBM sampling revealed no significant mineral values.	McHugh, 1984, p. 16
87	Unknown	9S	36E	4 SE 1/4	Gold	Workings consists of an inclined shaft, 60 to 80 ft. deep, dipping 45°E on bedded quartzite unit striking N15°E. Shaft appears to have been sunk on a 1 to 1 1/2 ft. wide zone of lighter colored quartzite intercalated within well bedded, laminated black micaceous quartzite. Lighter quartzite unit has what appears to be isolated blebs of pyrite and magnetite and some fracture surfaces have a coating of iron oxide. No other sulfide mineralization is obvious.	
118	Try again	9S	36E	36 NE 1/4	Talc , Limestone	Series of shallow dozer cuts (1 to 3 ft. deep) perpendicular to greenish hued limestone beds that strike N20°W and dip 55°NE.	
119	Try again	9S	36E	36	Talc	Small 5 ft. deep dozer cut on a crystalline limestone	

MINE NO.	NAME	LOCATION T.	R.	SEC.	COMMODITIES	COMMENTS	SELECTED REFERENCES
134	Desert View Prospect	10S	38E	3 SW 1/4 (projected)	Copper	Reported copper occurrence (unpublished BLM file). One chip sample across a limonitic shear zone in siltstone contained 0.01 percent copper.	Wrucke and others, 1984
148	Overholtz	9S	36E	28 N 1/2	Silver, Gold	The workings consists of 3 open pits 120 ft. x 50 ft. x 12 ft., one open cut 100 ft. x 12 ft. x 8 ft., and numerous adits and included shafts. The workings explore a series of N70°E 1.5 to 4 ft-thick quartz veins that contain hematite, limonite, pyrite, and minor galena. It is believed that the mine shipped forty-five tons of ore in the early part of 1950.	Norman, L.A. and Stewart, R.M., 1951; CDMG, vol 47, p. 174
167	Coffee Stop Prospect	13S	39E	33 SE 1/4 (projected)	Mercury	USBM reports up to six shallow prospect pits in alluvium. Cinnabar occurs interstitially and as thin coatings in Quaternary alluvium and in felsic lapilli tuff beds. Of thirty-five samples, twenty-seven contained no significant mineral values. Eight samples of screened alluvium contained from 0.1 to 1.4 lb. mercury per ton.	McHugh, 1984, p. 25; Wrucke, 1984 p. 23

APPENDIX B

MINERAL RESOURCE/RESERVE CLASSIFICATION NOMENCLATURE

APPENDIX B
MINERAL RESOURCE/ RESERVE CLASSIFICATION NOMENCLATURE

The following are definitions of the nomenclature ociated with the California Mineral Land Classification gram. It is important to refer to these definitions when dying the different resource categories shown on Fig- 3.

SOURCE: A concentration of naturally occurring, d, liquid, or gaseous material in or on the earth's crust such form and amount that economic extraction of a nmodity from the concentration is currently or poten- lly feasible.

SERVES: That part of the reserve base which could be nomically extracted or produced at the time of determi- tion. The term reserves need not signify that extraction ilities are in place and operative.

IGINAL RESOURCE: The amount of resource before duction.

ENTIFIED RESOURCES: Resources whose location, ade, quality, and quantity are known or estimated from ecific geologic evidence. Identified resources include nomic, marginally economic, and subeconomic compo- nts. To reflect varying degrees of geologic certainty, ese economic divisions can be subdivided into measured, licated and inferred.

MEASURED RESERVES: Quantity is computed from dimensions revealed in outcrops, trenches, workings, or drill holes; grade and (or) quality are computed from information similar to that used for measured resources, but the sites for inspection, sampling, and measurement are farther apart or otherwise less adequately spaced. The degree of assurance, although lower than that for measured resources, is high enough to assume continuity between points of observation.

INDICATED RESERVES: Quantity and grade and (or) quality are computed from information similar to that used for measured resources, but the sites for inspection, sampling and measurement are farther apart or are otherwise less adequately spaced. The degree of assurance, although lower than that for measured resources, is high enough to assume continuity between points of observation.

DEMONSTRATED: A term for the sum of measured plus indicated reserves.

INFERRED RESOURCES: Estimates are based on an assumed continuity beyond measured and (or) indicated resources, for which there is geologic evidence. Inferred resources may or may not be supported by samples or measurements.

MARGINAL RESERVES: What part of the resource base which, at the time of determination, borders on being economically producible. The essential characteristic here is economic uncertainty. Included are resources that would be producible, given postulated changes in economic or technologic factors.

ECONOMIC: This term implies that profitable extraction or production under defined investment assumptions has been established, an analytically demonstrated, or assumed with reasonable certainty.

SUBECONOMIC RESOURCE: The part of identified resources that does not meet the economic criteria of reserves and marginal reserves.

UNDISCOVERED RESOURCES: Resources, the existence of which are only postulated, comprising deposits that are separate from identified resources. Undiscovered resources may be postulated in deposits of such grade and physical location as to render them economic, marginally economic or subeconomic. To reflect varying degrees of geologic certainty, undiscovered resources may be divided into two parts:

HYPOTHETICAL RESOURCES: Undiscovered resources that are similar to known mineral bodies and that may be reasonably expected to exist in the same producing district or region under analogous geologic conditions. If exploration confirms their existence and reveals enough information about their quality, grade, and quantity, they will be reclassified as identified resources.

SPECULATIVE RESOURCES: Undiscovered resources that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not been made, or in types of deposits as yet unrecognized for their economic potential. If exploration confirms their existence and reveals enough information about their quantity, grade, and quality, they will be reclassified as identified resources.

INYO AND MONO COUNTIES, CALIFORNIA

MINERAL LAND CLASSIFICATION OF THE EUREKA-SALINE VALLEY AREA, INYO AND MONO COUNTIES, CALIFORNIA

1993

CALIFORNIA DEPARTMENT OF CONSERVATION

Division of
Mines and Geology

SPECIAL REPORT 166

THE RESOURCES AGENCY
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SECRETARY FOR RESOURCES

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GEOLOGY OF THE NORTH HALF OF THE EUREKA–SALINE VALLEY SMARA STUDY AREA

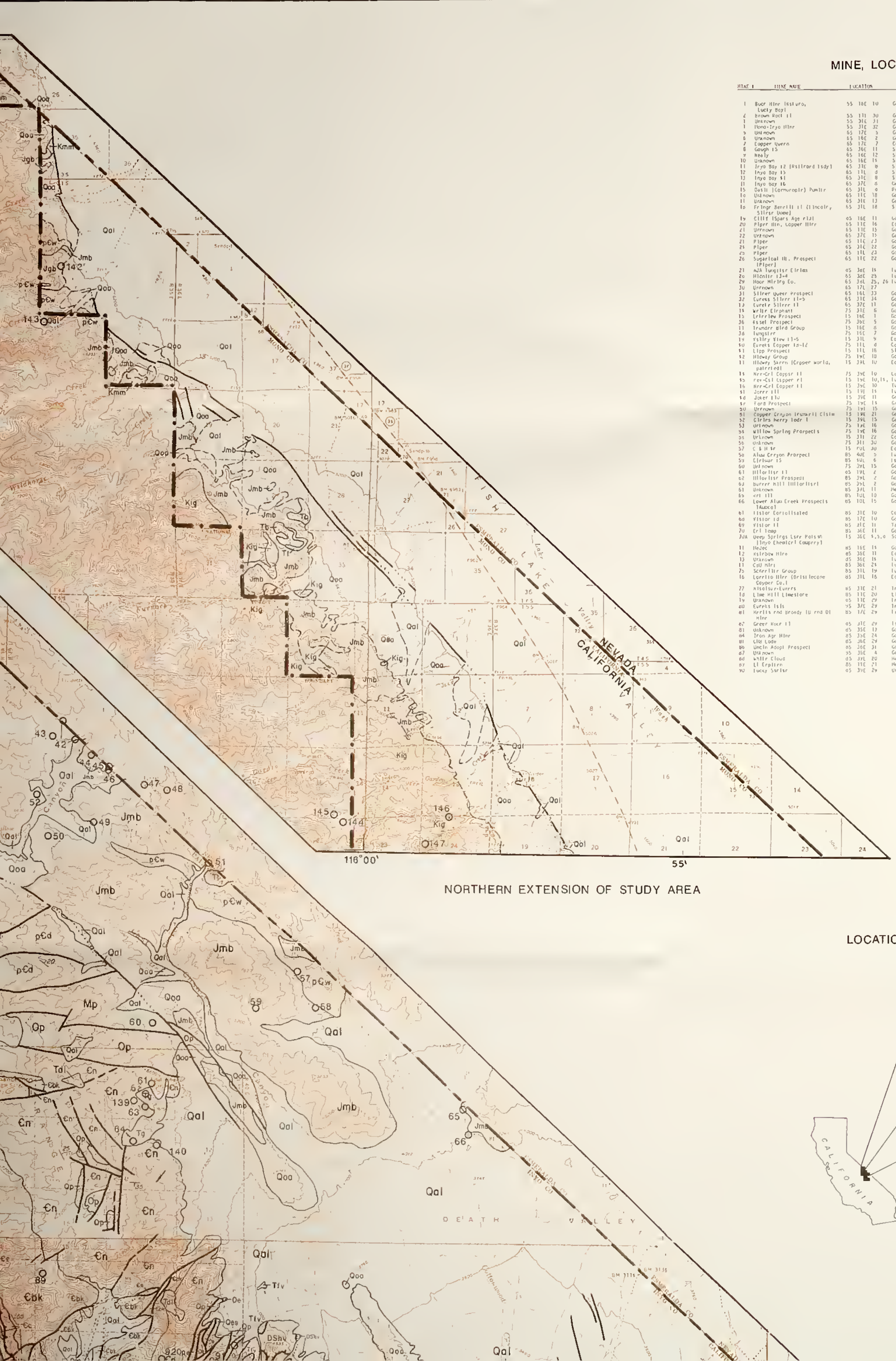
Includes
Blanco Mountain, Last Chance Range, Magruder Mountain, Mt. Barcroft, Piper Peak, Soldier Pass, Ubehebe Crater, Waucoba Mountain, and Waucoba Spring 15–Minute Quadrangles, Inyo and Mono Counties, California

Compiled and Modified by
Stephen E. Joseph and Gary C. Taylor

1987

SCALE 1:62,500

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761



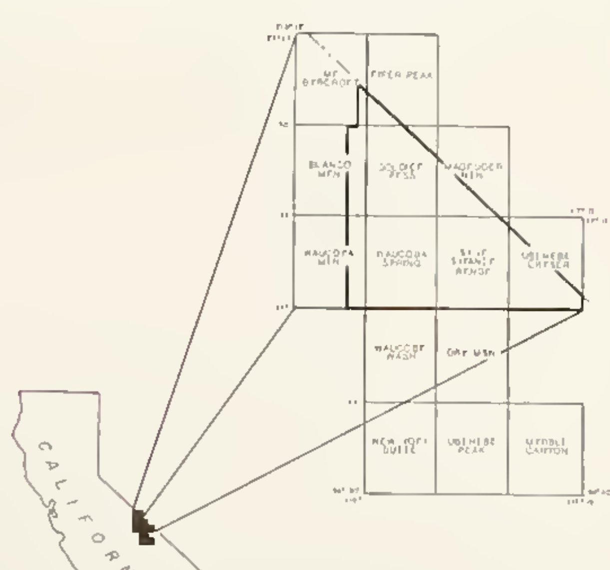
NORTHERN EXTENSION OF STUDY AREA

MINE, LOCATION AND COMMODITY INDEX

MINE #	MINE NAME	LOCATION	COMMODITIES
1	Buck Mine (Asturo, Lucky Boy)	5S 16E 10	Gold
2	Brown Rock #1	5S 11E 30	Gold
3	Unknown	5S 31E 31	Gold
4	Mono-Inyo Mine	5S 31E 32	Gold
5	Unknown	6S 17E 5	Gold?
6	Unknown	6S 16E 2	Gold, Silver, Lead
7	Copper Queen	6S 17E 7	Copper, Tungsten
8	Gough 15	6S 36E 11	Silver(?)
9	Nealy	6S 16E 12	Silver (?)
10	Unknown	6S 16E 14	Silver(?)
11	Inyo Boy #2 (Railroad Lady)	6S 31E 8	Silver, Copper
12	Inyo Boy #5	6S 11E 8	Silver, Copper
13	Inyo Boy #4	6S 31E 8	Silver, Copper
14	Inyo Boy #6	6S 37E 8	Gold, Silver, Copper?
15	Oasis (Cornucopia) Pumice	6S 31E 6	Pumice
16	Unknown	6S 11E 18	Gold
17	Unknown	6S 31E 13	Gold
18	Flinger Bendill #1 (Lincoln, Silver Dome)	6S 31E 18	Silver
19	Cliff (Spars Age #13)	6S 16E 11	Gold, Silver, Copper
20	Piper Mine, Copper Mine	6S 11E 16	Copper
21	Unknown	6S 11E 15	Gold, Silver
22	Unknown	6S 37E 15	Gold
23	Piper	6S 11E 23	Gold?
24	Piper	6S 31E 22	Gold, Silver
25	Piper	6S 11E 23	Gold?
26	Sugarloaf Mt. Prospect (Piper)	6S 11E 22	Gold, Silver, Copper
27	AJA Tungsten Claims	6S 38E 14	Tungsten
28	Hiemlie 13-4	6S 38E 25	Tungsten
29	Hoor Mining Co.	6S 38E 25, 26	Tungsten
30	Unknown	6S 17E 27	
31	Silver Queen Prospect	6S 16E 33	Gold, Silver
32	Eureka Silver #1-5	6S 31E 34	Gold
33	Eureka Silver #1	6S 37E 11	Gold?
34	White Elephant	7S 31E 6	Gold(?)
35	Fairview Prospect	7S 16E 1	Gold, Silver
36	Kissel Prospect	7S 36E 5	Gold
37	Thunder Bird Group	7S 16E 8	Gold, Silver
38	Tungsten	7S 16E 7	Gold, Silver
39	Valley View #1-5	7S 31E 9	Copper, Silver(?)
40	Eureka Copper #1-12	7S 11E 8	Copper
41	Lipp Prospect	7S 11E 18	Silver, Gold, Lead
42	Midway Group	7S 19E 10	Gold
43	Midway Skarn (Copper World, patented)	7S 39E 10	Copper
44	Mer-Cal Copper #1	7S 39E 10	Copper
45	Mer-Cal Copper #2	7S 19E 10, 15	Tungsten, Copper
46	Mer-Cal Copper #1	7S 39E 10	Tungsten, Copper
47	Joker #1	7S 19E 14	Tungsten, Copper
48	Joker #1	7S 39E 11	Gold, Tungsten
49	Ford Prospect	7S 19E 14	Gold
50	Unknown	7S 19E 15	Gold
51	Copper Canyon (Trumell Claim)	7S 19E 21	Gold, Copper
52	Claims Merry Lode 1	7S 39E 15	Gold(?)
53	Unknown	7S 19E 16	Gold?
54	Willow Spring Prospects	7S 19E 16	Gold(?)
55	Unknown	7S 31E 22	Copper(?), Gold?
56	Unknown	7S 31E 30	Gold(?)
57	C & H #r	7S 40E 30	Copper
58	Alum Canyon Prospect	8S 40E 5	Tungsten
59	Clrlsw 15	8S 40E 6	Lead, Gold
60	Unknown	7S 39E 15	Gold
61	Hillortise #1	8S 19E 2	Gold
62	Hillortise Prospect	8S 39E 2	Gold
63	Burner Hill (Hillortise)	8S 39E 2	Gold
64	Unknown	8S 39E 11	Mercury?
65	Ari #11	8S 10E 10	Gold
66	Lower Alum Creek Prospects (Aupco)	8S 10E 15	Gold
67	Vistor Consolidated	8S 31E 10	Copper, Gold(?)
68	Vistor #8	8S 17E 10	Gold(?)
69	Vistor #1	8S 21E 11	Talc
70	Erl Temp	8S 36E 11	Gold
70A	Deep Springs Lake Potash (Inyo Chemical Company)	7S 36E 4, 5, 6	Sodium, Potassium
71	Redec	8S 16E 14	Gold
72	Rainbow Mine	8S 36E 11	Copper, Gold
73	Unknown	8S 36E 14	Tungsten
74	C&D Mine	8S 36E 24	Tungsten
75	Scarlite Group	8S 31E 19	Tungsten, Copper
76	Loretto Mine (Bristlecone Copper Co.)	8S 31E 16	Copper
77	Nisolsur-Eureka	8S 31E 21	Talc
78	Lime Hill Limestone	8S 11E 20	Limestone
79	Unknown	8S 11E 29	Talc
80	Eureka Talc	9S 37E 29	Talc
81	Keelis and Broady 10 and 01 Mine	8S 17E 29	Talc
82	Green Door #1	8S 31E 29	Talc
83	Unknown	8S 35E 13	Gold
84	Iron Age Mine	8S 35E 24	Gold
85	Old Lode	8S 36E 29	Gold
86	Uncle Adopt Prospect	8S 36E 31	Gold(?)
87	Unknown	9S 35E 4	Gold(?)
88	White Cloud	8S 37E 20	Mercury, Gold
89	El Capitan	8S 11E 21	Mercury
90	Lucky Strike	8S 39E 29	Uranium, Copper
91	[illegible]	[illegible]	Mercury
92	[illegible]	[illegible]	Sulfur
93	[illegible]	[illegible]	Sulfur
94	El Dorado Lode [illegible]	[illegible]	Sulfur
95	Big [illegible]	[illegible]	Sulfur
96	Crater Mine	[illegible]	Sulfur
96A	Crater #1	[illegible]	Sulfur
97	Fraction and Southwest Sulphur Group	[illegible]	Sulfur
98	Gulf Group	[illegible]	Sulfur
99	Sally & [illegible]	[illegible]	Sulphur
100	Unknown	[illegible]	Sulphur
101	Midas #1	[illegible]	Sulfur, Mercury
102	Christopher #2 Prospect	[illegible]	Sulfur, Mercury
103	Alamo Prospect	[illegible]	Mercury
104	Rebecca #1	[illegible]	Mercury, Gold
105	Rebecca #2	[illegible]	Mercury, Gold
106	Lucky 13	[illegible]	Mercury
107	Up & Down Mine	[illegible]	Mercury, Gold, Silver
108	Up and Down #1-6	[illegible]	Mercury, Gold(?)
109	Mercury Knob Prospect	9S 39E 9	Mercury, Copper, Turquoise
110	Eureka Prospect (Bear Trail)	9S 39E 10	Mercury, Gold
111	Sulphur Queen	8S 19E 10	Sulfur
112	April Fool Prospect	9S 39E 9	Mercury
113	Storm Cloud	9S 19E 16	Mercury, Gold
114	Sally Joe Eureka Sulfur	9S 39E 12	Sulfur, Mercury
115	Silver Mine (Silver Bowl)	9S 41E 1	Silver, Gold
116	Birch Door Prospect	7S 37E 21	Copper, Gold, Silver
117	Weirer Prospect	9S 36E 25	Talc
118	Try Again	9S 36E 36	Talc, Limestone
119	Try Again	9S 10E 36	Talc, Limestone
120	Coyote (Mystery, Rainbow)	9S 31E 31	Gold, Copper, Tungsten
121	Marble Canyon Placers	10S 31E 1, 8, 9, 10	Gold
122	Silver Spur (Orisy Mine) (Bedell Mine)	10S 11E 13, 21	Lead, Gold, Zinc
123	Opal Mine	10S 37E 14	Lead, Silver, Zinc
124	Opportunity Prospect	10S 31E 20	Gold(?)
125	Tollar Prospect	10S 31E 30	Gold(?)
126	Lee Prospect (Lucky Mine)	10S 31E 30	Silver, Lead, Copper
127	Gingerbell "Apex" Prospect	10S 31E 29	Lead, Zinc, Silver(?)
128	August Prospect (Whippoorwill #1)	10S 31E 32	Silver, Lead, Copper, Zinc
129	Ruby Port	10S 31E 32	Silver, Lead, Copper
130	Del Rl (Dorrie, Newcastle Prospect)	10S 31E 31	Copper, Gold, Silver, Zinc
131	Hillerler Prospect	10S 37E 13	Lead, Silver
132	Erma (Hillside #1) Prospect	11S 31E 4	Lead, Silver
133	Morning Star (Pine Tree Mine)	11S 31E 2	Lead, Silver
134	Desert View Prospect	10S 10E 3	Copper
135	Lithium Occurrence	9S 17E 34	Lithium
136	Tiren Placer	10S 39E 1, 12, 13	Sand
137	Lee-Vrensia Prospect	11S 10E 6	Gold
138	Jimmy B.	11S 40E 1	Gold, Silver, Copper
139	Unknown	8S 39E 2	Mercury?
140	Unknown	8S 39E 11	Mercury, Limestone?
141	Jurrlie Circle	10S 42E 6, 7, 18	Gold
142	Six Pts	11 35E 31	Gold
143	Jail #2	4S 15E 14	Gold
144	Unknown	5S 36E 22	Gold
145	Unknown	5S 36E 15	Silver, Lead, Gold
146	Sirco #1	5S 16E 25	Gold
147	Unknown	5S 36E 21	Gold
148	Overrollz	9S 36E 28	Silver, Gold
149	Mineral Hill Group	8S 36E 29	Lead, Silver

○[136] Mine Index Number

LOCATION OF QUADRANGLES



EXPLANATION

SEDIMENTARY/METASEDIMENTARY ROCKS

Cenozoic — Quaternary

- Qs — Qs, dune sand
- Qal — Qal, unconsolidated fan, stream, and valley-fill deposits. Includes talus deposits
- Ql — Ql, playa silt, clay and salt beds
- Qls — Qls, landslide deposits
- Qcs — Qcs, spring deposits
- Qoa — Qoa, unconsolidated to partly consolidated fan, stream, and valley fill deposits

Tertiary

- Ts — Ts, sedimentary rocks

VOLCANIC ROCKS

- Qb — Qb, olivine basalt
- Tb — Tb, olivine basalt
- Tt — Tt, ash-flow tuffs
- Ttv — Ttv, felsic volcanic rocks

INTRUSIVE ROCKS

- Tdl — Diorite of Last Chance Range
- Tg — Granitic rocks of Last Chance Range
- Kd — Diorite of Waucoba Spring
- Ka
- Kmc — Quartz Monzonite of Marble Creek
- Kpl — Quartz Monzonite of Papoose Flat
- Kmm
- Klg
- Jgb
- Jmb
- Jma
- Jml
- Jdm
- Jpm
- Jpk
- Jh
- Jbd

Mesozoic — Cretaceous, Jurassic

WHITE-INYO MTNS FACIES

Permian

- Pov — Owens Valley Formation
- PPk — Keeler Canyon Formation

Mississippian

- Mrs — Rest Spring Shale
- Mp — Perdido Formation
- Mlm — Tin Mountain Limestone

DEATH VALLEY FACIES

- Pbs — Bird Spring Formation


INYO
NATIONAL
FOREST
Deep Spring Lake
Qal
Qoa
Jmj
Jdm
Tb
Cbk
Cn
Mp
E U R E K A
V A L L E Y
D E A T H
37°15'
Topographic Base by U.S. Geological Survey
5'
118°00'
R.36E.
R.37E.
55'
50'
117°45'
R.39E.
40'
R.40E.
35'

WHITE-INYO MTNS FACIES
DEATH VALLEY FACIES
Heavy border boxes indicate units that appear on this sheet.
DEATH VALLEY
DEATH VALLEY NATIONAL MONUMENT
MAGNETIC NORTH
TRUE NORTH
16½°
DECLINATION
INDEX TO GEOLOGIC MAPPING
1. K. B. Krauskopf, 1971.
3. C.A. Nelson, 1959-61
4. E.H. McKee and C.A. Nelson, 1967.
5. E.H. McKee, 1968.
6. C.A. Nelson, 1971.
7. C.A. Nelson, 1971.
13. James F. McAllister, 1946-51.
14. Generalized from McAllister, 1956.
EXPLANATION OF GEOLOGIC SYMBOLS
Geologic contact (dashed where inferred)
Fault traces, solid where well-located; dashed where approximately located or inferred; and dotted where concealed.
Thrust Fault (dashed where approximate; dotted where concealed; barb on upper plate).
Attitude of sedimentary rocks.
T.11S.
37° 00'
40'
R.40E.
35'
R.41E.
117°30'
R.41E.
25'
R.42E.
20'
R.43E.
117°15'

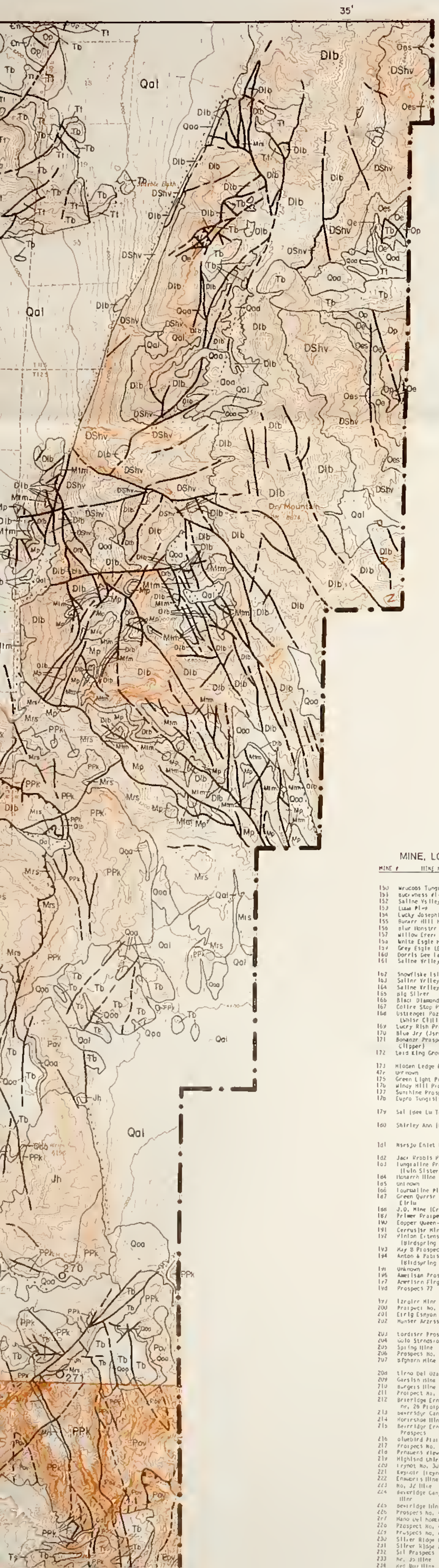
DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA-PETE WILSON, GOVERNOR
THE RESOURCES AGENCY-DOUGLAS P. WHEELER, SECRETARY FOR RESOURCES
DEPARTMENT OF CONSERVATION-EDWARD G. HEIDIG, DIRECTOR

MINE, LOCATION AND COMMODITY INDEX

MINE #	MINE NAME	LOCATION			COMMODITIES
150	Waucoba Tungsten Mine	11S	37E	21	Tungsten, Copper
151	Buckwheat #1-5	11S	37E	29	Tungsten
152	Saline Valley Quartz	11S	37E	28	Quartz
153	Lisa #1-4	12S	37E	4	Lead, Silver(?)
154	Lucky Josephine #11 & 17	12S	37E	9	Lead, Silver
155	Bunker Hill Mine	12S	37E	5	Lead-Silver
156	Blue Monster Mine	12S	37E	20	Lead, Silver
157	Willow Creek Mine	13S	37E	32	Talc
158	White Eagle Mine	13S	37E	3	Talc
159	Grey Eagle (Eleanor)	13S	37E	10	Talc
160	Dorris Dee Talc Mine	13S	37E	14	Talc
161	Saline Valley Sand Dunes	13S	38E	33,32 34	Sand
162	Snowflake Talc Mine	14S	38E	18	Talc
163	Saline Valley Borax	14S	38E	22	Boron
164	Saline Valley Salt	14S	38E	26	Sodium
165	Big Silver	14S	38E	34	Silver
166	Black Diamond Prospect	13S	39E	4	Manganese, Tungsten
167	Coffee Stop Prospect	13S	39E	33	Mercury
168	Ostrenger Pozzolan (White Cliffs)	11S	39E	3	Pozzolan
169	Lucky Rich Prospect	13S	39E	32	Copper
170	Blue Jay (Jarosite)	14S	40E	27	Copper, Molybdenum
171	Bonanza Prospect (Hesson Clipper)	15S	40E	10	Copper, Silver, Gold, Tungsten, Uranium
172	Lead King Group (Lippincott)	15S	40E	24	Lead, Silver, Copper, Molybdenum
173	Hidden Ledge Prospect	15S	41E	19	Copper, Lead, Silver
174	Unknown	15S	40E	24	Silver
175	Green Light Prospect	15S	40E	31	Silver
176	Windy Hill Prospect	15S	40E	31	Silver
177	Sunshine Prospect	15S	40E	31	Silver, Lead, Tungsten
178	Cupro Tungstite Prospect	15S	41E	30	Copper, Tungsten, Silver, Gold
179	Sal Dee Ee Teel Group	15S	40E	36	Copper, Silver, Gold, Tungsten
180	Shirley Ann (Eureka)	16S	40E	1	Copper, Silver, Lead, Gold, Tungsten, Molybdenum
181	Navajo Chief Prospect	16S	40E	1	Copper, Lead, Silver, Gold
182	Jack Rabbit Prospect	16S	40E	1	Copper, Tungsten
183	Tungsaline Prospect (Twin Sisters)	15S	41E	19	Silver, Copper, Tungsten
184	Monarch Mine	15S	41E	31	Gold, Silver, Tungsten
185	Unknown	15S	41E	33	Gold?
186	Tourmaline #1-4	16S	41E	4	Tourmaline, Copper
187	Green Quartz (Hourglass) Claim	16S	41E	21	Copper
188	J.O. Mine (Calwet Group)	15S	41E	20	
189	Palmer Prospect	15S	41E	20	Copper
190	Copper Queen-Lucky Boy	16S	40E	11	Copper
191	Cerrusite Mine	16S	40E	1	Lead, Silver
192	Pinion Extension (Birdspring Garnet)	16S	40E	1	Lead, Silver, Copper
193	May B Prospect	16S	40E	6	Lead, Silver, Copper
194	Anton & Pobst Mine (Birdspring Garnet)	16S	40E	6	Copper
195	Unknown	16S	40E	18	Lead, Silver
196	American Prospect	15S	39E	30	Silver
197	American Flag Mine	15S	39E	9	Gold, Silver, Copper
198	Prospect 71	15S	38E	9	Silver, Gold, Copper, Lead
199	Trapier Mine	15S	38E	9	Gold, Silver, Lead
200	Prospect No. 78	15S	38E	16	Gold
201	Craig Canyon	15S	38E	1	
202	Hunter Arrastres	14S	38E	31	Gold, Silver, Copper, Lead
203	Loadstar Prospect	15S	38E	6	Copper
204	Gold Standard Mine	14S	38E	32	Silver, Gold, Copper
205	Spring Mine	14S	38E	29	Gold
206	Prospect No. 62	14S	38E	30	Gold
207	Bighorn Mine area	14S	37E	36	Gold, Silver, Copper, Lead
208	Llano Del Oro Prospect	14S	37E	36	Copper
209	Gavalan Mine area	14S	37E	36	Gold
210	Burgess Mine area	15S	37E	13	Silver, Lead, Zinc, Gold
211	Prospect No. 12	15S	37E	12	Silver, Gold, Copper
212	Beveridge Canyon HM No. 26 Prospect	14S	37E	35	Gold
213	Beveridge Canyon HM Prospect	14S	37E	26	Gold
214	Horseshoe Mine	14S	37E	26	Gold, Silver, Copper
215	Beveridge Canyon HM No. 28 Prospect	14S	37E	23	Gold
216	Bluebird Prospect	14S	37E	27	Gold, Copper
217	Prospect No. 29	14S	37E	21	Gold
218	Panamint View Mine	14S	37E	22	Gold, Silver, Lead
219	Highland Chief Mine	14S	37E	23	Gold
220	Keynot No. 30 Prospect	14S	37E	22	Gold, Silver, Copper
221	Keynote (Keynot) Mine	14S	37E	15,22	Gold, Silver, Copper
222	Chambers Mine	14S	37E	23	Gold, Silver
223	No. 32 Mine	14S	37E	23	
224	Beveridge Canyon HM No. 12 Mine	14S	37E	23	Gold
225	Beveridge Mine	14S	37E	23	Gold, Silver
226	Prospect No. 49	14S	37E	24	Gold
227	Mano Del Hombre Mine	14S	37E	24	Gold
228	Prospect No. 44	14S	37E	24	Gold, Silver
229	Prospect No. 43	14S	37E	24	Silver, Gold
230	Silver Ridge No. 3 Prospect	14S	38E	18	
231	Silver Ridge No. 2 Mine	14S	38E	18	Silver, Gold, Lead, Zinc

STATE OF CALIFORNIA-PETE WILSON, GOVERNOR
THE RESOURCES AGENCY-DOUGLAS P. WHEELER, SECRETARY FOR RESOURCES
DEPARTMENT OF CONSERVATION-EDWARD G. HEIDIG, DIRECTOR



GEOLOGY OF THE SOUTH HALF OF THE EUREKA–SALINE VALLEY SMARA STUDY AREA

Includes
Dry Mountain, Marble Canyon, New York Butte, Ubehebe Peak
and Waucoba Wash 15–Minute Quadrangles, Inyo County, California

Compiled and Modified
by
Stephen E. Joseph and Gary C. Taylor

1987

SCALE 1:62,500

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

MINE, LOCATION AND COMMODITY INDEX

MINE #	MINE NAME	LOCATION			COMMODITIES
150	Waucoba Tungsten Mine	11S	37E	21	Tungsten, Copper
151	Buckness #1-5	11S	37E	29	Tungsten
152	Saline Valley Quartz	11S	37E	28	Quartz
153	Liam Mine	12S	37E	4	Lead, Silver(?)
154	Lucky Josephine #11 & 17	12S	37E	9	Lead, Silver
155	Bunker Hill Mine	12S	37E	5	Lead-Silver
156	Blue Monster Mine	12S	37E	20	Lead, Silver
157	Willow Creek Mine	13S	37E	32	Talc
158	White Eagle Mine	13S	37E	3	Talc
159	Grey Eagle (Eleanor)	13S	37E	10	Talc
160	Dorris Gee Talc Mine	13S	37E	14	Talc
161	Saline Valley Sand Dunes	13S	38E	33,32 34	Sand
162	Snowflake Talc Mine	14S	38E	16	Talc
163	Saline Valley Borax	14S	38E	22	Boron
164	Saline Valley Salt	14S	39E	26	Sodium
165	Big Silver	14S	38E	34	Silver
166	Black Diamond Prospect	13S	39E	4	Manganese, Tungsten
167	Coffee Stop Prospect	13S	39E	33	Mercury
168	Ustrenger Pozzolan (White Cliffs)	11S	39E	3	Pozzolan
169	Lucky Rish Prospect	13S	39E	17	Copper
170	Blue Jay (Jarosite)	14S	40E	27	Copper, Molybdenum
171	Bonanza Prospect (Hesson Clipper)	15S	40E	10	Copper, Silver, Gold, Tungsten, Uranium
172	Lead King Group (Lippincott)	15S	40E	24	Lead, Silver, Copper, Molybdenum
173	Hidden Ledge Prospect	15S	41E	19	Copper, Lead, Silver
174	Unknown	15S	40E	24	Silver
175	Green Light Prospect	15S	40E	31	Silver
176	Windy Hill Prospect	15S	40E	31	Silver
177	Sunshine Prospect	15S	40E	31	Silver, Lead, Tungsten
178	Cupro Tungstite Prospect	15S	41E	30	Copper, Tungsten, Silver, Gold
179	Sal (Dee Lu Tee) Group	15S	40E	36	Copper, Silver, Gold, Tungsten
180	Shirley Ann (Lucile)	16S	40E	1	Copper, Silver, Lead, Gold, Tungsten, Molybdenum
181	Marsjo Enlet Prospect	16S	40E	1	Copper, Lead, Silver, Gold
182	Jack Rabbit Prospect	16S	40E	1	Copper, Tungsten
183	Tungraline Prospect (Lulu Sisters)	15S	41E	19	Silver, Copper, Tungsten
184	Monarch Mine	15S	41E	31	Gold, Silver, Tungsten
185	Unknown	15S	41E	33	Gold?
186	Tourmaline #1-4	16S	41E	5	Tourmaline, Copper
187	Green Quartz (Hourglass) Claim	16S	41E	21	Copper
188	J.O. Mine (Crimes Group)	15S	41E	20	
189	Primer Prospect	15S	41E	20	Copper
190	Copper Queen-Lucky Boy	16S	40E	17	Copper
191	Cerrusite Mine	16S	40E	7	Lead, Silver
192	Pinion Extension (Birdspring Garnet)	16S	40E	7	Lead, Silver, Copper
193	Kay B Prospect	16S	40E	6	Lead, Silver, Copper
194	Anton & Pabis Mine (Birdspring Garnet)	16S	40E	6	Copper
195	Unknown	16S	40E	18	Lead, Silver
196	American Prospect	15S	39E	30	Silver
197	American Flag Mine	15S	38E	9	Gold, Silver, Copper
198	Prospect 77	15S	38E	9	Silver, Gold, Copper, Lead
199	Izroler Mine	15S	38E	9	Gold, Silver, Lead
200	Prospect No. 70	15S	38E	16	Gold
201	Eirlg Canyon	15S	38E	7	
202	Hunter Arrastra	14S	38E	31	Gold, Silver, Copper, Lead
203	Lordisrr Prospect	15S	38E	6	Copper
204	Gold Stradsio Mine	15S	38E	32	Silver, Gold, Copper
205	Spring Mine	14S	38E	29	Gold
206	Prospect No. 62	14S	38E	30	Gold
207	Bighorn Mine area	14S	37E	36	Gold, Silver, Copper, Lead
208	Cerro Del Oza Prospect	15S	37E	36	Copper
209	Garcia Mine area	15S	37E	36	Gold
210	Burgess Mine area	15S	37E	13	Silver, Lead, Zinc, Gold
211	Prospect No. 72	15S	37E	12	Silver, Gold, Copper
212	Beveridge Canyon IM No. 26 Prospect	14S	37E	35	Gold
213	Beveridge Canyon IM Prospect	14S	37E	26	Gold
214	Horseshoe Mine	14S	37E	26	Gold, Silver, Copper
215	Beveridge Canyon IM No. 20 Prospect	14S	37E	28	Gold
216	Bluebird Prospect	14S	37E	27	Gold, Copper
217	Prospect No. 29	15S	37E	27	Gold
218	Pinawens View Mine	14S	37E	22	Gold, Silver, Lead
219	Highland Chief Mine	14S	37E	23	Gold
220	Trymot No. 30 Prospect	15S	37E	22	Gold, Silver, Copper
221	Keynoir (Lcynoll) Mine	14S	37E	15,22	Gold, Silver, Copper
222	Enawors Mine	15S	37E	23	Gold, Silver
223	No. 32 Mine	14S	37E	23	
224	Beveridge Canyon IM No. 12 Mine	14S	37E	23	Gold
225	Beveridge Mine	14S	37E	23	Gold, Silver
226	Prospect No. 49	14S	37E	24	Gold
227	Mano Del Hombre Mine	14S	37E	24	Gold
228	Prospect No. 44	14S	37E	25	Gold, Silver
229	Prospect No. 63	14S	37E	25	Silver, Gold
230	Silver Ridge No. 3 Prospect	14S	38E	18	
231	Silver Ridge No. 2 Mine	14S	38E	16	Silver, Gold, Lead, Zinc
232	Sil Prospect	14S	38E	18	Gold, Silver
233	No. 35 Mine	14S	37E	13	Gold, Silver, Copper
234	Red Box Mine	[illegible]	[illegible]	[illegible]	[illegible]

EXPLANATION

SEDIMENTARY/METASEDIMENTARY ROCKS

Cenozoic — Quaternary

- Qs — Qs, dune sand
- Qal — Qal, unconsolidated fan, stream, and valley-fill deposits. Includes talus deposits
- Ql — Ql, playa silt, clay and lake beds
- Qls — Qls, landslide deposits
- Qos — Qos, spring deposits
- Qoa — Qoa, unconsolidated to partly consolidated fan, stream, and valley fill deposits

Tertiary

- Ts — Ts, sedimentary rocks

VOLCANIC ROCKS

- Qb — Qb, olivine basalt
- Tb — Tb, olivine basalt
- Tt — Tt, tuff
- Tlv — Tlv, latite volcanic rocks

INTRUSIVE ROCKS

Tdr, Tg, Kd, Ka, Kmc, Kqf, Kmm, Kig, Jgb, Jmb, Jmo, Jmj, Jdm, Jqm, Jpk, Jh, Jnb

Mesozoic — Cretaceous, Jurassic

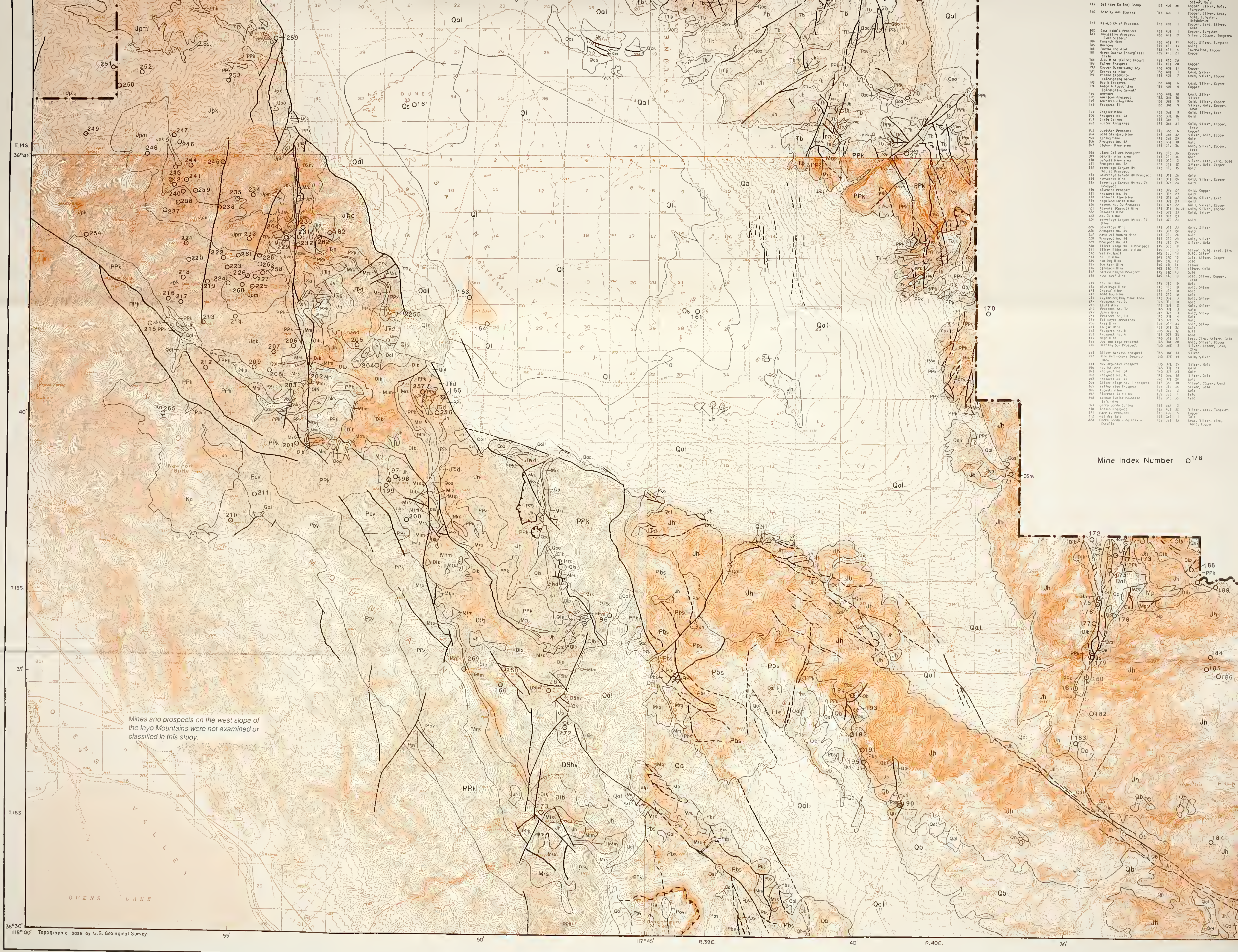
WHITE-INYO MTNS FACIES

Permian

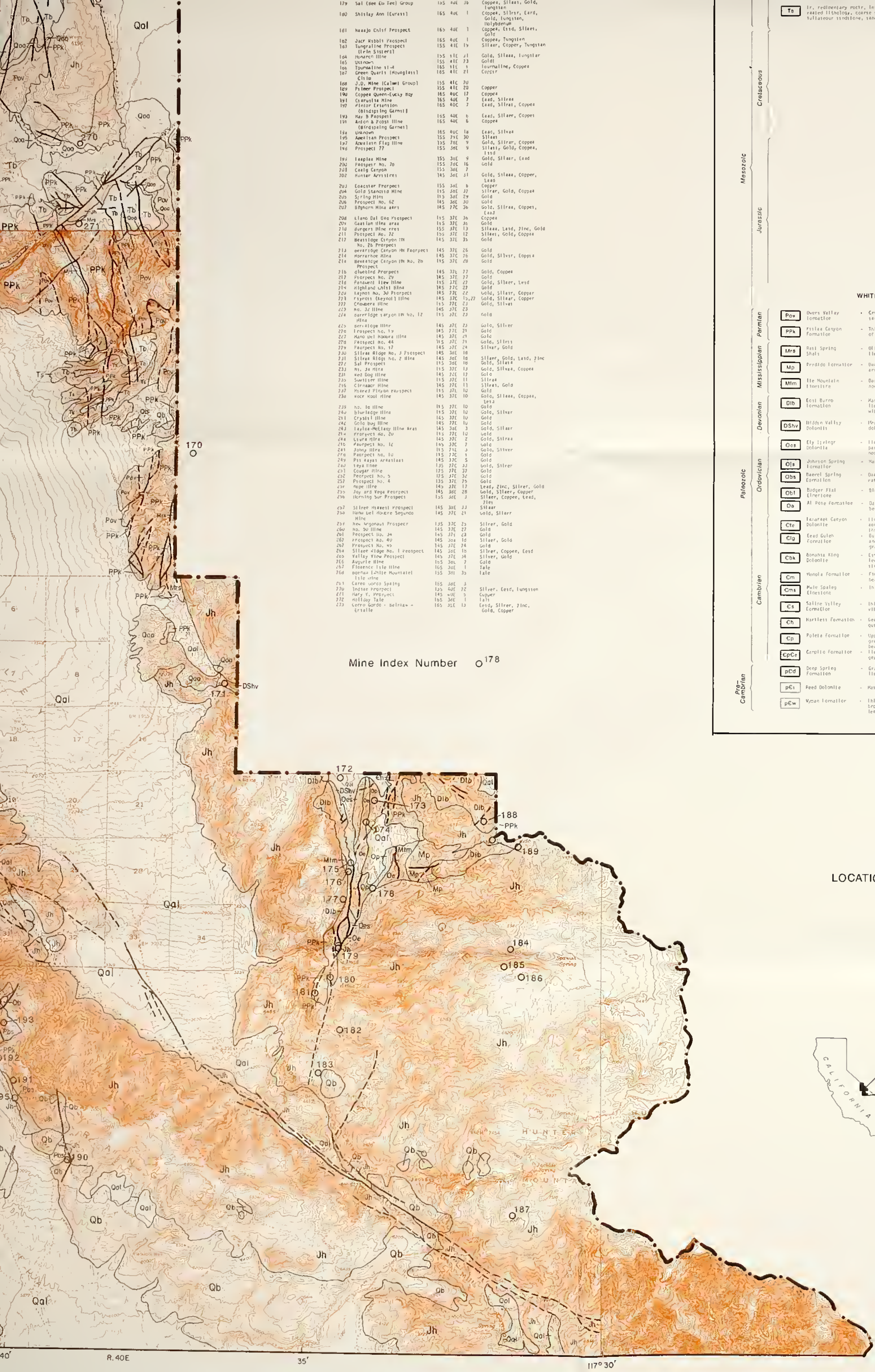
- Pov — Owens Valley Formation
- PPk — Keeler Canyon Formation
- Mrs — Rest Spring Shale
- Mp — Perdido Formation

DEATH VALLEY FACIES

- PPb — Bird Spring Formation



Mines and prospects on the west slope of the Inyo Mountains were not examined or classified in this study.
Mine Index Number
Topographic base by U.S. Geological Survey.
T.14S.
T.15S.
T.16S.
36°45'
36°30'
118°00'
117°45'
R.39E.
R.40E.
DUNES
SALINE VALLEY
OWENS VALLEY
OWENS LAKE
New York Butte
Salt Lake



No.	Name	T.	R.	Sec.	Commodities
179	Sal (Bee Eu Tee) Group	15S	40E	36	Copper, Silver, Gold, Tungsten
180	Shirley Ann (Eureka)	16S	40E	1	Copper, Silver, Lead, Gold, Tungsten, Molybdenum
181	Navajo Chief Prospect	16S	40E	1	Copper, Lead, Silver, Gold
182	Jack Rabbit Prospect	16S	40E	1	Copper, Tungsten
183	Tungraline Prospect (Twin Sisters)	15S	41E	19	Silver, Copper, Tungsten
184	Monarch Mine	15S	41E	31	Gold, Silver, Tungsten
185	Unknown	15S	41E	23	Gold
186	Tourmaline 11-4	16S	41E	1	Tourmaline, Copper
187	Green Quartz (Hourglass) Claim	16S	41E	21	Copper
188	J.D. Mine (Calmet Group)	15S	41E	20	
189	Palmer Prospect	15S	41E	20	Copper
190	Copper Queen-Lucky Boy	16S	40E	17	Copper
191	Ciarutlia Mine	16S	40E	7	Lead, Silver
192	Pinion Extension (Birdspring Garnet)	16S	40E	7	Lead, Silver, Copper
193	May B Prospect	16S	40E	6	Lead, Silver, Copper
194	Anton & Fobst Mine (Birdspring Garnet)	16S	40E	6	Copper
[illegible]	Unknown	16S	40E	18	Lead, Silver
195	American Prospect	15S	39E	30	Silver
197	American Flag Mine	15S	38E	9	Gold, Silver, Copper
198	Prospect 77	15S	38E	9	Silver, Gold, Copper, Lead
199	Eagles Mine	15S	38E	9	Gold, Silver, Lead
200	Prospect No. 76	15S	38E	16	Gold
201	Craig Canyon	15S	38E	7	
202	Hunter Arrastres	14S	38E	31	Gold, Silver, Copper, Lead
203	Coaster Prospect	15S	38E	6	Copper
204	Gold Standard Mine	14S	38E	32	Silver, Gold, Copper
205	Spring Mine	14S	38E	29	Gold
206	Prospect No. 62	14S	38E	30	Gold
207	Bighorn Mine area	14S	37E	36	Gold, Silver, Copper, Lead
208	Llano Del Oro Prospect	14S	37E	36	Copper
209	Gaatlan Mine area	14S	37E	36	Gold
210	Burgert Mine area	15S	37E	13	Silver, Lead, Zinc, Gold
211	Prospect No. 72	15S	37E	12	Silver, Gold, Copper
212	Beveridge Canyon TN No. 26 Prospect	14S	37E	35	Gold
213	Beveridge Canyon HN Prospect	14S	37E	26	Gold
214	Horseshoe Mine	14S	37E	26	Gold, Silver, Copper
215	Beveridge Canyon TN No. 28 Prospect	14S	37E	28	Gold
216	Bluebird Prospect	14S	37E	22	Gold, Copper
217	Prospect No. 29	14S	37E	22	Gold
218	Panamint View Mine	14S	37E	27	Gold, Silver, Lead
219	Highland Chief Mine	14S	37E	27	Gold
220	Reynolds No. 30 Prospect	14S	37E	22	Gold, Silver, Copper
221	[illegible] (Reynolds) Mine	14S	37E	15,22	Gold, Silver, Copper
222	Chambers Mine	14S	37E	23	Gold, Silver
223	No. 32 Mine	14S	37E	23	
224	Beveridge Canyon TN No. 12 Mine	14S	37E	23	Gold
225	Beveridge Mine	14S	37E	23	Gold, Silver
226	Prospect No. 19	14S	37E	21	Gold
227	Mano Del Hombre Mine	14S	37E	21	Gold
228	Prospect No. 44	14S	37E	21	Gold, Silver
229	Prospect No. 17	14S	37E	24	Silver, Gold
230	Silver Ridge No. 3 Prospect	14S	38E	18	
231	Silver Ridge No. 2 Mine	14S	38E	18	Silver, Gold, Lead, Zinc
232	Sal Prospect	14S	38E	18	Gold, Silver
233	Mt. Ja Mine	14S	37E	13	Gold, Silver, Copper
234	Red Dog Mine	14S	37E	12	Gold
235	Sweitzer Mine	14S	37E	11	Silver
236	Cinnabar Mine	14S	37E	11	Silver, Gold
237	Mixed Pinyon Prospect	14S	37E	10	Gold
238	Rock Pool Mine	14S	37E	10	Gold, Silver, Copper, Lead
239	No. 16 Mine	14S	37E	10	Gold
240	Blueledge Mine	14S	37E	10	Gold, Silver
241	Crystal Mine	14S	37E	10	Gold
242	Gold Bug Mine	14S	37E	10	Gold
243	Taylor-McElroy Mine Area	14S	38E	3	Gold, Silver
244	Prospect No. 20	14S	37E	10	Gold
245	Laura Mine	14S	37E	2	Gold, Silver
246	Prospect No. 16	14S	37E	2	Gold
247	Johnny Mine	14S	37E	3	Gold, Silver
248	Prospect No. 10	14S	37E	1	Gold
249	[illegible]	14S	37E	5	Gold
250	Leya Mine	13S	37E	33	Gold, Silver
251	Cougar Mine	13S	37E	32	Gold
252	Prospect No. 5	13S	37E	32	Gold
253	Prospect No. 4	13S	37E	25	Gold
254	Hope Mine	14S	37E	17	Lead, Zinc, Silver, Gold
255	Joy and Vega Prospect	14S	38E	28	Gold, Silver, Copper
256	Morning Sun Prospect	15S	38E	3	Silver, Copper, Lead, Zinc
257	Silver Maxwell Prospect	14S	38E	33	Silver
258	Mano Del Hombre Segundo Mine	14S	37E	21	Gold, Silver
259	New Argonaut Prospect	13S	37E	25	Silver, Gold
260	No. 50 Mine	14S	37E	27	Gold
261	Prospect No. 34	14S	37E	23	Gold
262	Prospect No. 40	14S	38E	18	Silver, Gold
263	Prospect No. 45	14S	37E	24	Gold
264	Silver Ridge No. 1 Prospect	14S	38E	18	Silver, Copper, Lead
265	Valley View Prospect	14S	37E	34	Silver, Gold
266	Augurie Mine	16S	38E	7	Gold
267	Florence Talc Mine	16S	38E	1	Talc
268	Pagenau (White Mountain) Talc Mine	15S	38E	35	Talc
269	Cerro Gordo Spring	16S	38E	3	
270	Indian Prospect	15S	40E	22	Silver, Lead, Tungsten
271	Mary Y. Prospect	14S	40E	5	Copper
272	Holliday Talc	16S	38E	1	Talc
273	Cerro Gordo - Belshaw - Estelle	16S	38E	13	Lead, Silver, Zinc, Gold, Copper

Mine Index Number ○[178]

Ts — Ts, sedimentary rocks. Includes the Coso Formation, boulders and cobbles of [illegible] lithology, coarse sand underlying [illegible] rocks, [illegible] breccias, [illegible] sandstone, sandstone, and conglomerate

Tt — [illegible] tuff, with some tuffaceous sediments; includes [illegible] Mountain Tuff, [illegible] dated at 10.5–11.5 m.y. based on K-Ar dating

Tlv — Tlv, felsic volcanic rocks including rhyolite, latite, obsidian, and perlite

Mesozoic — Cretaceous

Kd — Diorite at [illegible] Spring — [illegible]

Ka — [illegible] — [illegible]

Kmc — [illegible] — [illegible]

Kpf — [illegible] — [illegible]

Kmm — [illegible] — [illegible]

Kig — [illegible] — [illegible]

Mesozoic — Jurassic

Jgb — [illegible] — [illegible]

Jmb — [illegible] — [illegible]

Jme — [illegible] — [illegible]

Jmj — [illegible] — [illegible]

Jdm — [illegible] — [illegible]

Jpm — [illegible] — [illegible]

Jpk — [illegible] — [illegible]

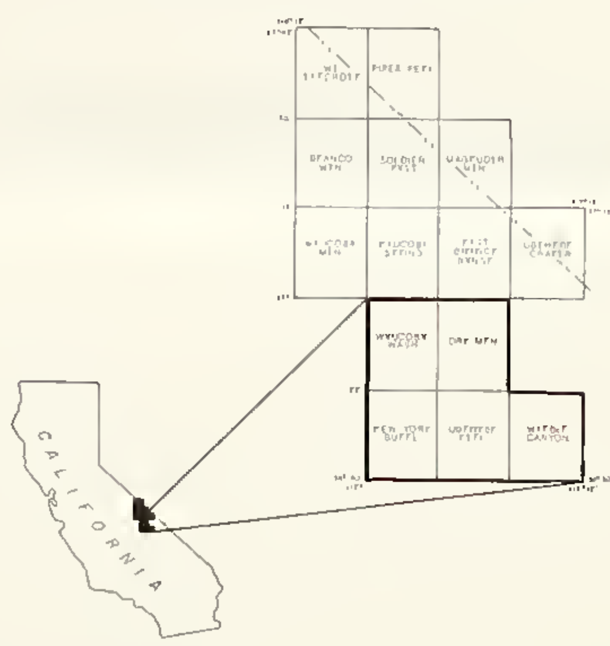
Jh — [illegible] — [illegible]

JTRd — [illegible] — [illegible]

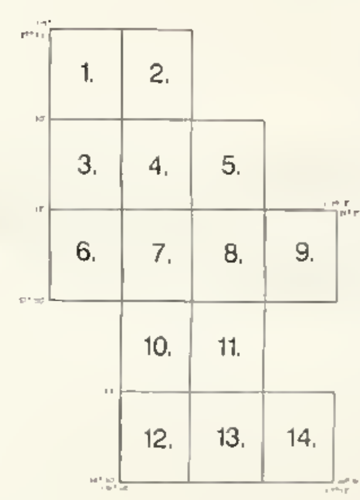
		WHITE-INYO MTNS FACIES	DEATH VALLEY FACIES
Paleozoic	Permian	Pov — Owens Valley Formation PPk — Keeler Canyon Formation	Pbs — Bird Spring Formation
	Mississippian	Mrs — Rest Spring Shale Mp — Perdido Formation Mtm — Tin Mountain Limestone	
	Devonian	Dlb — Lost Burro Formation DShv — Hidden Valley Dolomite	
	Ordovician	Oes — Ely Springs Dolomite Ojs — Johnson Spring Formation Obs — Barrel Spring Formation Obf — Badger Flat Limestone Oa — Al Rose Formation	Oe — Eureka Quartzite Op — Pogonip Group
	Cambrian	Ctc — Tamarack Canyon Dolomite Clg — Lead Gulch Formation Cbk — Bonanza King Dolomite Cm — Monola Formation Cms — Mule Spring Limestone Csv — Saline Valley Formation Ch — Harkless Formation Cp — Poleta Formation CpCc — Campito Formation	Cn — Nopah Formation Cc — Carrara Formation Cz — Zabriskie Quartzite CpCw — Wood Canyon Formation
Pre-Cambrian		pCd — Deep Spring Formation pCr — Reed Dolomite pCw — Wyman Formation	

Heavy border boxes indicate units that appear on this sheet

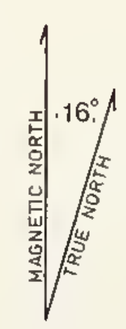
LOCATION OF QUADRANGLES



INDEX TO GEOLOGIC MAPPING



1. K. B. Krauskopf, 1971.
2. J.H. Stewart, 1961-62, 1968-69; P.T. Robinson, 1961-62, 19[illegible]-68 J.P. Albers, 1961-62; and O.F. Crowder, 1969.
3. C.A. Nelson, 1959-61
4. E.H. McKee and C.A. Nelson, 1967.
5. E.H. McKee, 1968.
6. C.A. Nelson, 1971.
7. C.A. Nelson, 1971.
8. C. Wrucke, 1981-83.
9. C. Wrucke, 1981-82 (M. Casteel, 1984)
10. D.C. Ross, K.F. Fox, E.M. MacEvett, F.K. Miller, C.A. Nelson, K.M. Scott, and H.G. Stephens, 1962-65.
11. B. Clark Burchfiel, 1969 (C.Wrucke).
12. Geology modified from Ross, 1967 and McAllister 1956
13. James F. McAllister, 1946-51.
14. Generalized from McAllister, 1956.



DECLINATION

EXPLANATION OF GEOLOGIC SYMBOLS

Geologic contact (dashed where inferred)

Fault traces, solid where well-located; dashed where approximately located or inferred; and dotted where concealed.

Thrust Fault (dashed where approximate, dotted where concealed; barb on upper plate).

25 Attitude of sedimentary rocks.

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA-PETE WILSON, GOVERNOR
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DEPARTMENT OF CONSERVATION-EDWARD G. HEIDIG, DIRECTOR

STATE OF CALIFORNIA PETE WILSON, GOVERNOR
THE RESOURCES AGENCY DOUGLAS P. WHEELER, SECRETARY FOR RESOURCES
DEPARTMENT OF CONSERVATION EDWARD G. HEIDIG, DIRECTOR

MINERAL LAND CLASSIFICATION MAP NORTH HALF OF THE EUREKA–SALINE VALLEY SMARA STUDY AREA

Includes
Blanco Mountain, Last Chance Range, Magruder Mountain, Mt. Barcroft, Piper Peak, Soldier Pass, Ubehebe Crater, Waucoba Mountain and Waucoba Spring 15–Minute Quadrangles, Inyo and Mono Counties, California

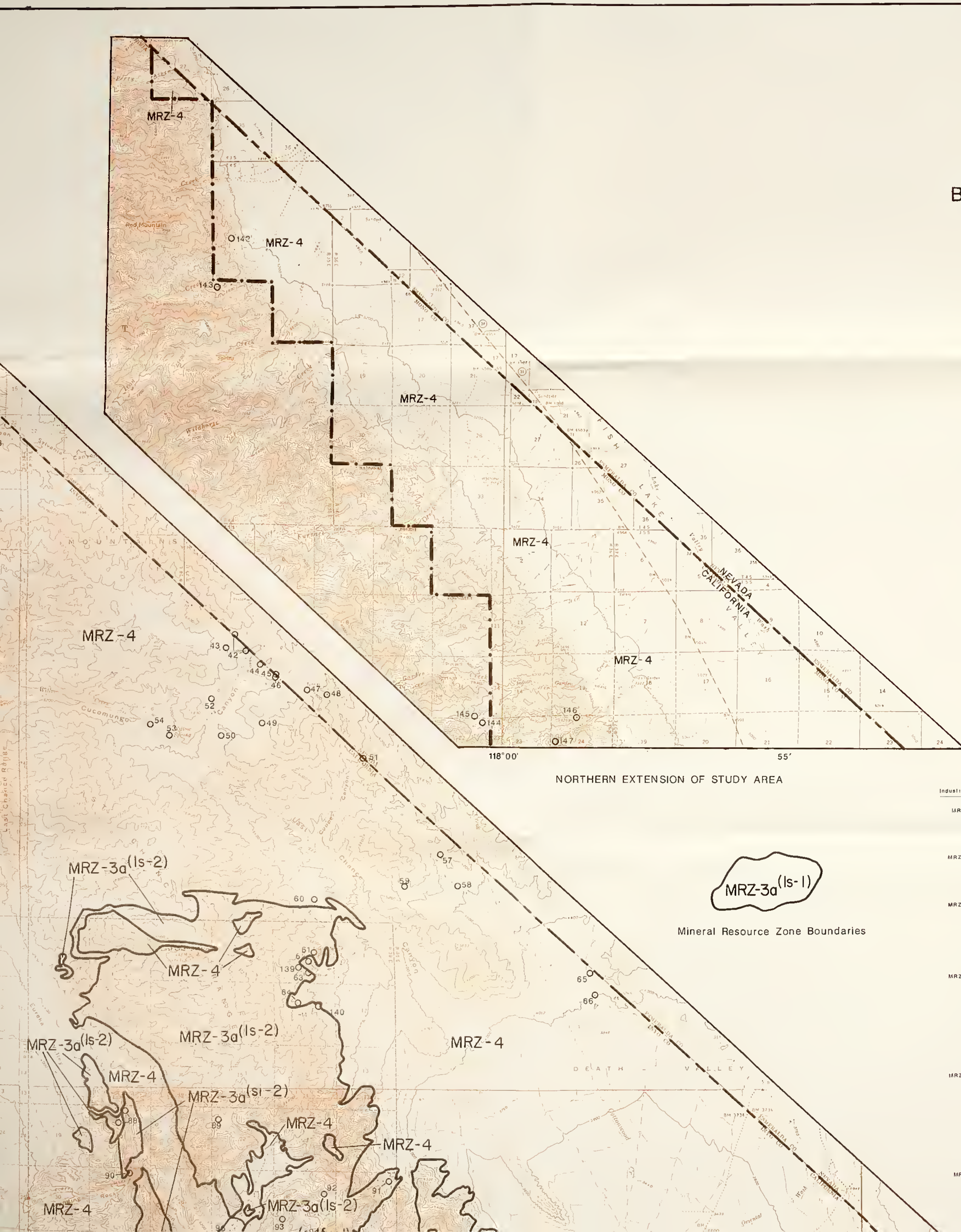
Areas Classified for Industrial Mineral Deposits

By
Gary C. Taylor and Stephen E. Joseph

1987

SCALE 1:62,500

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761



Industrial Mineral Deposits

MRZ-1III: Areas where available geologic information indicates there is little likelihood for the presence of industrial mineral deposits.

MRZ-2aIII: Areas where geologic data indicates that significant measured or indicated industrial mineral reserves are present.

MRZ-2bIII: Areas underlain by deposits containing industrial minerals where geologic information indicates significant inferred resources of rock suitable for use as a marketable product are present.

MRZ-3aIII: Areas underlain by geologic terranes within which undiscovered industrial mineral resources similar to known deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance.

MRZ-3bIII: Areas that may contain undiscovered industrial mineral resources that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not been made, or in types of deposits as yet unrecognized for their economic potential (speculative resources).

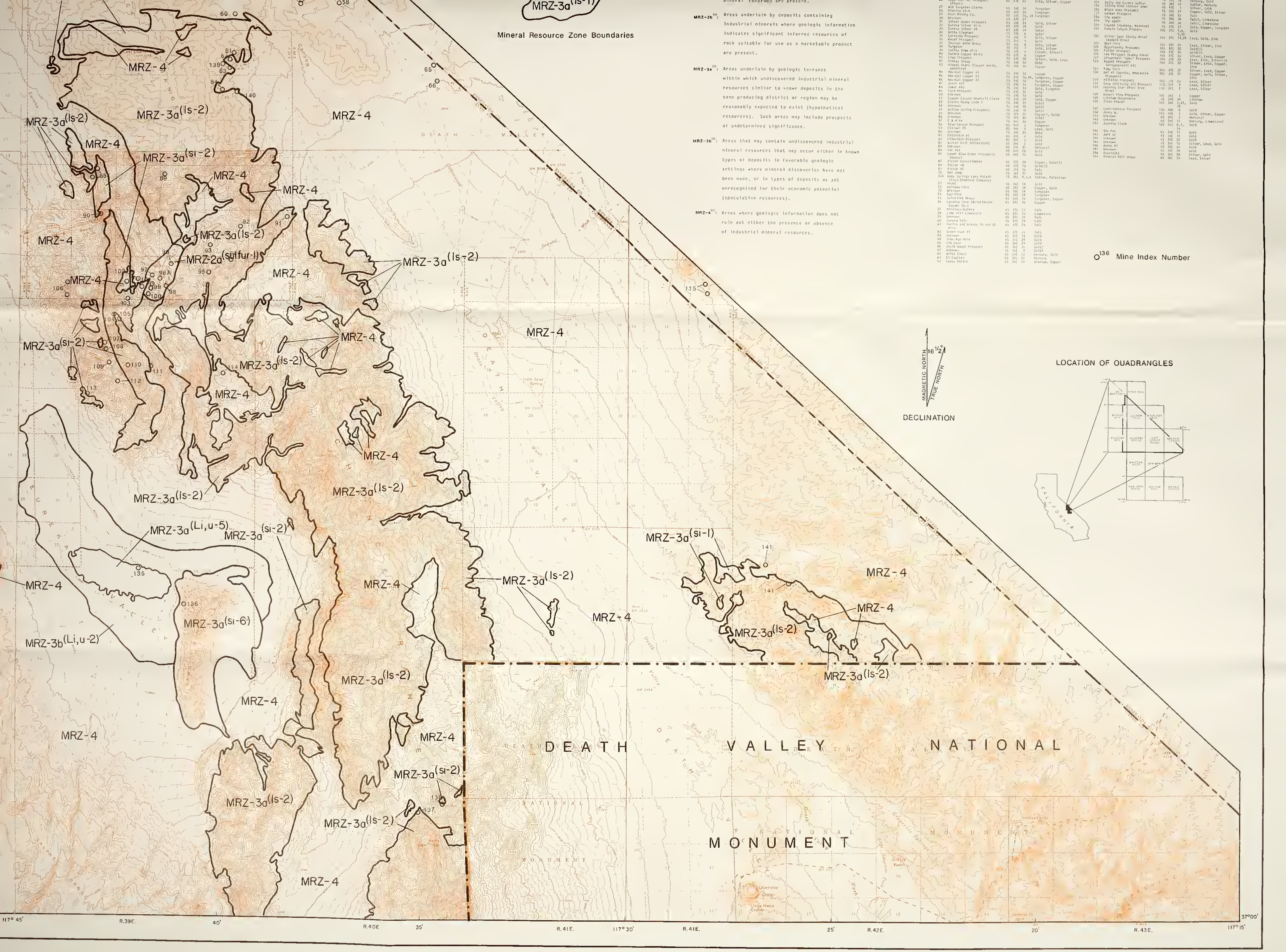
MRZ-4III: Areas where geologic information does not rule out either the presence or absence of industrial mineral resources.

MINE, LOCATION AND COMMODITY INDEX

MINE #	MINE NAME	LOCATION			COMMODITIES
1	Buck Mine (Kelunu, Lucky Boy)	5S	36E	30	Gold
2	Brown Rock #1	5S	33E	30	Gold
3	Unknown	5S	33E	31	Gold
4	Mono-Inyo Mine	5S	33E	32	Gold
5	Unknown	6S	31E	5	Gold?
6	Unknown	6S	36E	3	Gold, Silver, Lead
7	Copper Queen	6S	37E	7	Copper, Tungsten
8	Gough 15	6S	36E	11	Silver(?)
9	Neely	6S	36E	12	Silver (?)
10	Unknown	6S	36E	14	Silver(?)
11	Inyo Boy #7 (Railroad Ledge)	6S	33E	8	Silver, Copper
12	Inyo Boy #5	6S	33E	8	Silver, Copper
13	Inyo Boy #1	6S	33E	8	Silver, Copper
14	Inyo Boy #6	6S	33E	8	Gold, Silver, Copper?
15	Oasis (Cornucopia) Pumice	6S	33E	5	Pumice
16	Unknown	6S	31E	18	Gold
17	Unknown	6S	33E	13	Gold
18	Fringe Benefit #1 (Lincoln, Silver Dome)	6S	33E	18	Silver
19	Cliff (Stone Age #13)	6S	36E	13	Gold, Silver, Copper
20	Piper Mine, Copper Mine	6S	33E	16	Copper
21	Unknown	6S	33E	15	Gold, Silver
22	Unknown	6S	33E	15	Gold
23	Piper	6S	31E	23	Gold?
24	Piper	6S	37E	22	Gold, Silver
25	Piper	6S	33E	23	Gold?
26	Sugarloaf Mt. Prospect (Piper)	6S	33E	22	Gold, Silver, Copper
27	AJA Tungsten Claims	6S	38E	14	Tungsten
28	Midnite #1-4	6S	38E	25	Tungsten
29	Moon Mining Co.	6S	38E	25, 26	Tungsten
30	Unknown	6S	37E	21	
31	Silver Queen Prospect	6S	36E	33	Gold, Silver
32	Eureka Silver #1-5	6S	33E	34	Gold
33	Eureka Silver #6	6S	31E	3?	Gold?
34	White Elephant	7S	33E	6	Gold?
35	[illegible] Prospect	7S	36E	[illegible]	Gold, Silver
36	Rebel Prospect	7S	36E	5	Gold
37	Thunder Bird Group	7S	36E	8	Gold, Silver
38	Tungstar	7S	36E	1	Gold, Silver
39	Valley View #1-5	7S	31E	9	Copper, Silver?
40	Eureka Copper #8-12	7S	33E	8	Copper
41	Lipp Prospect	7S	37E	15	Silver, Gold, Lead
42	Midway Group	7S	3?E	19	Gold
43	Midway Seven (Copper World, patented)	7S	37E	10	Copper
44	Nev-Cal Copper #1	7S	39E	10	Copper
45	Nev-Cal Copper #1	7S	39E	10, 14	Tungsten, Copper
46	Nev-Cal Copper #1	7S	39E	10	Tungsten, Copper
47	Joker #33	7S	39E	1?	Tungsten, Copper
48	Joker #10	7S	39E	1?	Gold, Tungsten
49	Ford Prospect	7S	39E	14	Gold
50	Unknown	7S	39E	15	Gold
51	Copper Canyon (Russell Claim)	7S	39E	24	Gold, Copper
52	Claim: Hero lode 1	7S	3?E	15	Gold?
53	Unknown	7S	3?E	16	Gold(?)
54	Willow Spring Prospect	7S	3?E	15	Gold?
55	Unknown	7S	33E	[illegible]	Copper(?), Gold?
56	Unknown	7S	37E	30	Gold(?)
57	E & M [illegible]	7S	40E	30	Copper
58	Alum Canyon Prospect	8S	40E	5	Tungsten
59	Clemson #5	8S	40E	6	Lead, Gold
60	Unknown	7S	39E	35	Gold
61	Millovitch #1	8S	39E	?	Gold
62	Millovitch Prospect	8S	39E	?	Gold
63	Burger Mill (Millovitch)	8S	39E	?	Gold
64	Unknown	8S	39E	11	Mercury?
65	Vel #33	8S	40E	10	Gold
66	Lower Alum Creek Prospect (Alucol)	8S	40E	15	Gold
67	Victor Consolidated	8S	31E	10	Copper, Gold(?)
68	Victor 10	8S	31E	10	Gold(?)
69	Victor #1	8S	31E	15	Talc
70	Col Jeep	6S	36E	11	Gold
70A	Deep Springs Lake Potash (Inyo Chemical Company)	7S	36E	4,5,6	Sodium, Potassium
71	Madec	8S	35E	11	Gold
72	Rainbow Mine	8S	36E	11	Copper, Gold
73	Unknown	8S	36E	31	Tungsten
74	Cod Mine	8S	36E	21	Tungsten
75	Scheelite Group	8S	33E	19	Tungsten, Copper
76	Loretto Mine (Bristlecone Copper Co.)	8S	31E	16	Copper
77	Nicolaus-Lucero	8S	33E	21	Talc
78	Lime Hill Limestone	8S	37E	20	Limestone
79	Unknown	8S	33E	29	Talc
80	Eureka Talc	8S	33E	29	Talc
81	Morris and Broady (U and I) Mine	8S	37E	2?	Talc
82	Green Rock 11	8S	33E	29	Talc
83	Unknown	8S	35E	13	Gold
84	Iron Age Mine	8S	35E	24	Gold
85	Lila Lode	8S	36E	24	Gold
86	Uncle Adolph Prospect	8S	36E	35	Gold?
87	Unknown	7S	36E	1	Gold?
88	White Cloud	8S	37E	20	Mercury, Gold
89	El Capitan	8S	33E	[illegible]	Mercury
91	Mac G #1	8S	39E	25	Mercury
92	J & L #6	8S	39E	26	Sulfur
93	Lower American #61-66	8S	39E	26	Sulfur
94	El Dorado Lode 15	8S	39E	35	Sulfur
95	Big El Dorado	8S	39E	35	Sulfur
96	Crater Mine	8S	39E	33	Sulfur
96A	Crater #1	8S	39E	33	Sulfur
97	Fraction and Southwest Sulphur Group	8S	39E	33	Sulfur
98	Gulch Group	8S	39E	33	Sulfur
99	Golts & Tatelo	8S	39E	33	Sulphur
100	Unknown	8S	39E	33	Sulphur
101	Mesar 15	8S	39E	33	Sulfur, Mercury
102	[illegible] 12 Prospect	8S	39E	33	Mercury(?)
103	Alone Prospect	8S	39E	33	Mercury
104	Rebecca 31	9S	39E	4	Mercury, Gold
105	Rebecca #2	9S	39E	?	Mercury, Gold
106	Lucky 13	8S	39E	31	Mercury
107	Up & Down Mine	9S	39E	9	Mercury, Gold, Silver
108	Up and Down #1-6	9S	39E	9	Mercury, Gold(?)
109	Mercury Knob Prospect	9S	39E	9	Mercury, Copper, Tungsten
110	Lucky Prospect (Bear Cat)	9S	39E	10	Mercury, Gold
111	Sulphur Queen	9S	39E	10	Sulfur
112	April Fool Prospect	9S	39E	9	Mercury
113	Silver Cloud	9S	39E	16	Mercury, Gold
114	Sally Joe Eureka Sulfur	9S	39E	12	Sulfur, Mercury
115	Silvie Mine (Silver [illegible])	9S	31E	1	Silver, Gold
116	Blair Rock Prospect	7S	33E	23	Copper, Gold, Silver
117	Keller Prospect	9S	36E	25	Talc
118	Try Again	9S	36E	26	Talc?, Limestone
119	Try Again	9S	36E	36	Talc?, Limestone
120	Coyote (Mystery, Rainbow)	9S	33E	31	Gold, Copper, Tungsten
121	Marble Canyon Placers	10S	31E	7,8, 9,10	Gold
122	Silver Spur (Kelly Mine) (Wedell Mine)	10S	33E	13,21	Lead, Gold, Zinc
123	Opal Mine	10S	33E	1?	Lead, Silver, Zinc
124	Opportunity Prospect	10S	33E	20	Gold(?)
125	Fuller Prospect	10S	37E	30	Gold(?)
126	Lee Prospect (Lucky Mine)	10S	33E	30	Silver, Lead, Copper
127	Gingerbell 'Apex' Prospect	10S	33E	29	Lead, Zinc, Silver(?)
128	August Prospect (Whippoorwill #1)	10S	31E	3?	Silver, Lead, Copper, Zinc
129	Ruby Fool	10S	33E	2?	Silver, Lead, Copper
130	Del el Joannie, Newcastle Prospect	10S	31E	31	Copper, Gold, Silver, Zinc
131	Hillside Prospect	10S	31E	23	Lead, Silver
132	Emma (Hillside #1) Prospect	11S	33E	4	Lead, Silver
133	Howling Siren (Pine Tree Mine)	11S	31E	2	Lead, Silver
134	Desert View Prospect	10S	3?E	3	Copper
135	Lithium Occurrence	9S	39E	34	Lithium
136	Titan Placers	10S	39E	1,12, 13	Sand
137	Lee-Vevers Prospect	11S	40E	6	Gold
138	Jenny B.	11S	40E	1	Gold, Silver, Copper
139	Unknown	8S	39E	?	Mercury?
140	Unknown	8S	39E	11	Mercury, Limestone(?)
141	Juniper Claim	10S	42E	6,7, 18	Gold
142	Six Pac	4S	35E	11	Gold
143	Jeff 12	4S	35E	14	Gold
144	Unknown	5S	36E	22	Gold
145	Unknown	5S	36E	15	Silver, Lead, Gold
146	Aztec #1	5S	35E	24	Gold
147	Unknown	5S	36E	3?	Gold
148	Overholtz	5S	36E	28	Silver, Gold
149	Mineral Hill Group	8S	36E	29	Lead, Silver

O136 Mine Index Number

MRZ-2b(Na,K-2)
Deep Spring Lake
MRZ-4
MRZ-3a(ls-2)
MRZ-3a(si-2)
MRZ-3a(talc-2)(ls-2)
MRZ-2a(sulfur-1)
MRZ-3a(talc-9)
MRZ-3a(Li,u-5)
MRZ-3b(Li,u-2)
MRZ-3a(si-6)
INYO
NATIONAL
FOREST
Papoose Flat
Topographic Base by U.S. Geological Survey
118°00'
R.36E.
R.37E
55'
50'
117°45'
R.39E.
40'
37°15'


Mineral Resource Zone Boundaries
mineral reserves are present.
MRZ-2b(ii): Areas underlain by deposits containing industrial minerals where geologic information indicates significant inferred resources of rock suitable for use as a marketable product are present.
MRZ-3a(ii): Areas underlain by geologic terranes within which undiscovered industrial mineral resources similar to known deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance.
MRZ-3b(ii): Areas that may contain undiscovered industrial mineral resources that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not been made, or in types of deposits as yet unrecognized for their economic potential (speculative resources).
MRZ-4(ii): Areas where geologic information does not rule out either the presence or absence of industrial mineral resources.
136 Mine Index Number
LOCATION OF QUADRANGLES
CALIFORNIA
DECLINATION
MAGNETIC NORTH
TRUE NORTH
16 1/2°
MRZ-4
MRZ-3a(ls-2)
MRZ-3a(si-2)
MRZ-2a(sulfur-1)
MRZ-3a(si-1)
MRZ-3a(Li,u-5)
MRZ-3b(Li,u-2)
MRZ-3a(si-6)
DEATH VALLEY NATIONAL MONUMENT
EUREKA VALLEY
117° 45'
R.39E.
40'
R.40E
35'
R.41E.
117° 30'
25'
R.42E.
20'
R.43E.
117° 15'
37° 00'

DIVISION OF MINES AND GEOLOGY
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STATE OF CALIFORNIA-PETE WILSON, GOVERNOR
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DEPARTMENT OF CONSERVATION-EDWARD G. HEIDIG, DIRECTOR

MINERAL LAND CLASSIFICATION MAP SOUTH HALF OF THE EUREKA–SALINE VALLEY SMARA STUDY AREA

Includes
Dry Mountain, Marble Canyon, New York Butte, Ubehebe Peak and Waucoba Wash 15–Minute Quadrangles, Inyo County, California

Areas Classified for Industrial Mineral Deposits

By
Gary C. Taylor and Stephen E. Joseph

1987

SCALE 1:62,500

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

Industrial Mineral Deposits

MRZ-1(1): Areas where available geologic information indicates there is little likelihood for the presence of industrial mineral deposits.

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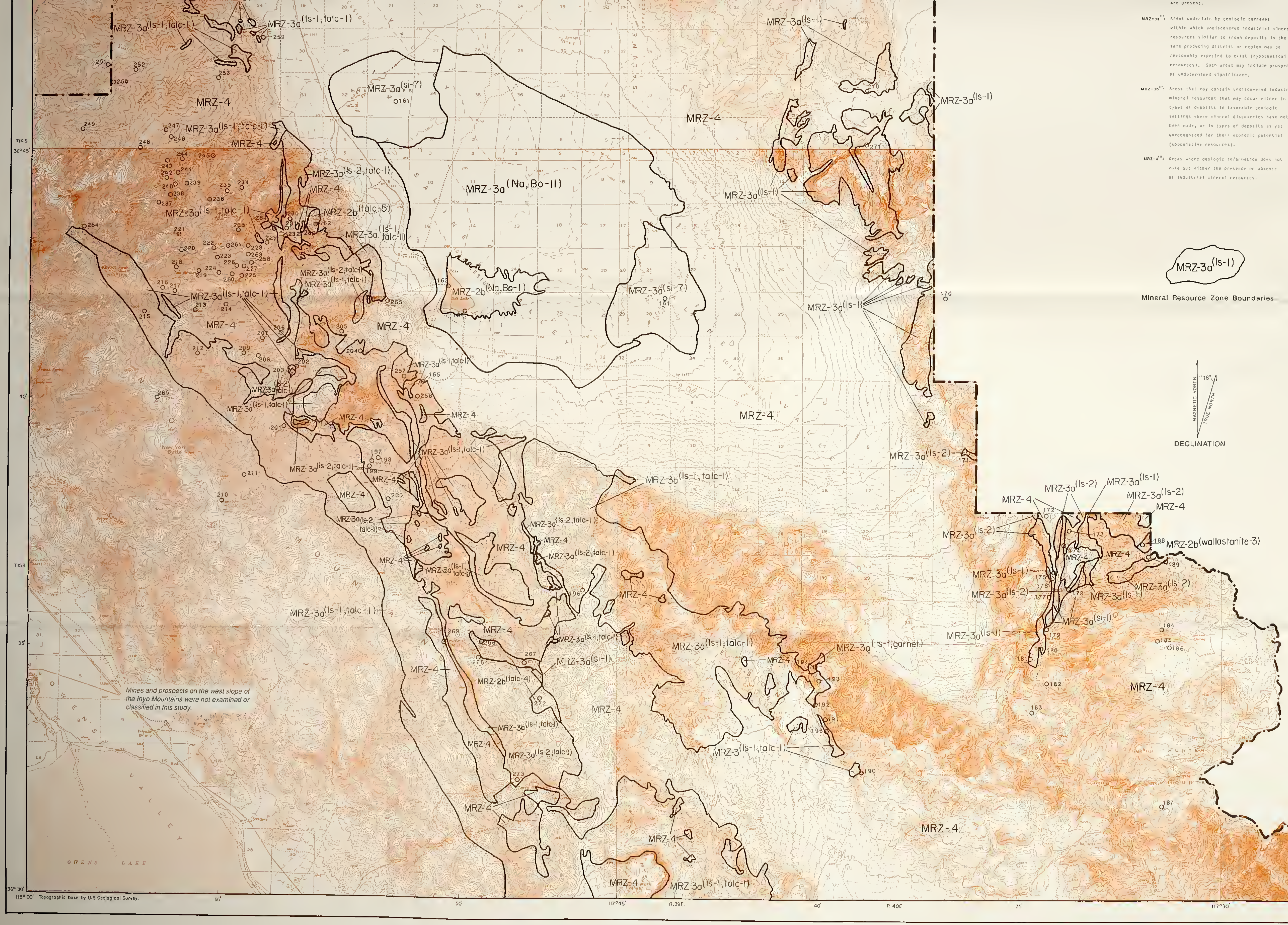
MRZ-4(1): Areas where geologic information does not rule out either the presence or absence of industrial mineral resources.

MINE, LOCATION AND COMMODITY INDEX

MINE #	MINE NAME	LOCATION	COMMODITIES
[illegible]	[illegible]	[illegible]	[illegible]



are present.

MRZ-3a[iii]: Areas underlain by geologic terranes within which undiscovered industrial mineral resources similar to known deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance.

MRZ-3b[iii]: Areas that may contain undiscovered industrial mineral resources that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not been made, or in types of deposits as yet unrecognized for their economic potential (speculative resources).

MRZ-4[iii]: Areas where geologic information does not rule out either the presence or absence of industrial mineral resources.

MRZ-3a(ls-1)

Mineral Resource Zone Boundaries

MAGNETIC NORTH
TRUE NORTH

DECLINATION

o178 Mine Index Number

LOCATION OF QUADRANGLES

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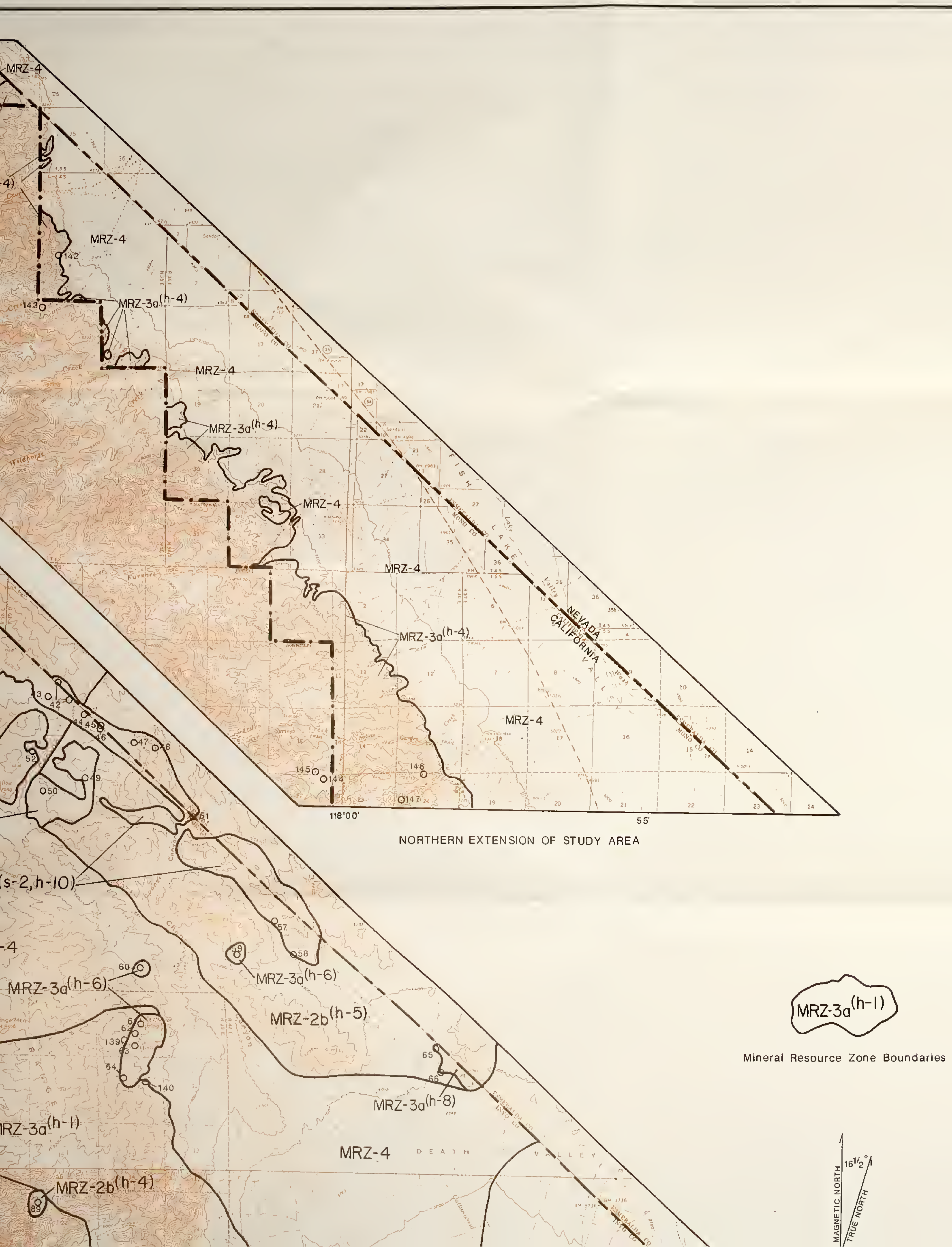


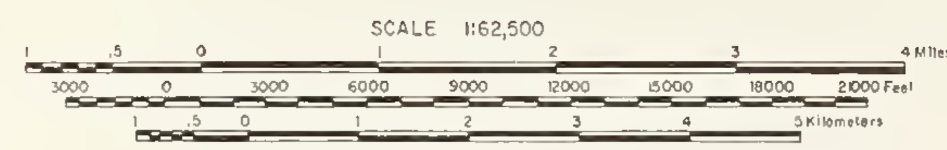
MINERAL LAND CLASSIFICATION MAP NORTH HALF OF THE EUREKA-SALINE VALLEY SMARA STUDY AREA

Includes
Blanco Mountain, Last Chance Range, Magruder Mountain, Mt. Barcroft, Piper Peak, Soldier Pass, Ubehebe Crater, Waucoba Mountain, and Waucoba Spring 15-Minute Quadrangles, Inyo and Mono Counties, California

Areas Classified for Deposits Formed by Hydrothermal, Contact Metasomatic, and Placer Processes

By
Gary C. Taylor and Stephen E. Joseph

1987



PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

MINE, LOCATION AND COMMODITY INDEX

MINE #	MINE NAME	LOCATION	COMMODITIES
1	Buck Mine (Kriuno, Lucky Boy)	5S 36E 30	Gold
2	Brown Rock #1	5S 37E 30	Gold
3	Unknown	5S 37E 31	Gold
4	Mono-Inyo Mine	5S 37E 32	Gold
5	Unknown	6S 37E 5	Gold?
6	Unknown	6S 36E 2	Gold, Silver, Lead
7	Copper Queen	6S 37E 7	Copper, Tungsten
8	Gough #5	6S 36E 11	Silver(?)
9	Kerly	6S 36E 12	Silver (?)
10	Unknown	6S 36E 14	Silver(?)
11	Inyo Boy #2 (Railroad Lady)	6S 37E 8	Silver, Copper
12	Inyo Boy #5	6S 37E 8	Silver, Copper
13	Inyo Boy #1	6S 37E 8	Silver, Copper
14	Inyo Boy #6	6S 37E 8	Gold, Silver, Copper?
15	Oasis (Cornucopia) Pumice	6S 37E 8	Pumice
16	Unknown	6S 37E 18	Gold
17	Unknown	6S 37E 13	Gold
18	Fringe Benefit #1 (Lincoln, Silver Dome)	6S 37E 18	Silver
19	Cliff (Space Age #13)	6S 36E 13	Gold, Silver, Copper
20	Piper Mtn. Copper Mine	6S 37E 16	Copper
21	Unknown	6S 37E 15	Gold, Silver
22	Unknown	6S 37E 15	Gold
23	Piper	6S 37E 23	Gold?
24	Piper	6S 37E 22	Gold, Silver
25	Piper	6S 37E 23	Gold?
26	Sugarloaf Mt. Prospect (Piper)	6S 37E 22	Gold, Silver, Copper
27	AJA Tungsten Claims	6S 36E 14	Tungsten
28	Midnite 13-4	6S 38E 25	Tungsten
29	Moon Mining Co.	6S 38E 25, 26	Tungsten
30	Unknown	6S 37E 27	
31	Silver Queen Prospect	6S 36E 33	Gold, Silver
32	Eureka Silver #1-5	6S 37E 34	Gold
33	Eureka Silver #4	6S 37E 34	Gold?
34	White Elephant	7S 37E 6	Gold?
35	Lakeview Prospect	7S 36E 4	Gold, Silver
36	Kesef Prospect	7S 36E 5	Gold
37	Thunder Bird Group	7S 36E 8	Gold, Silver
38	Tungster	7S 36E 7	Gold, Silver
39	Valley View #1-5	7S 37E 9	Copper, Silver?
40	Eureka Copper #8-12	7S 37E 8	Copper
41	Lipp Prospect	7S 37E 18	Silver, Gold, Lead
42	Midway Group	7S 39E 10	Gold
43	Mowey Skarn (Copper World, patented)	7S 39E 10	Copper
44	Nev-Cal Copper #1	7S 39E 10	Copper
45	Nev-Cal Copper #1	7S 39E 10,14,	Tungsten, Copper
46	Nev-Cal Copper #1	7S 39E 10	Tungsten, Copper
47	Joker #77	7S 39E 14	Tungsten, Copper
48	Joker #70	7S 39E 13	Gold, Tungsten
49	Ford Prospect	7S 39E 14	Gold
50	Unknown	7S 39E 15	Gold
51	Copper Canyon (Kumell) Claim	7S 39E 24	Gold, Copper
52	Claire Heavy Lode 1	7S 39E 15	Gold?
53	Unknown	7S 39E 16	Gold?
54	Willow Spring Prospects	7S 39E 16	Gold?
55	Unknown	7S 37E 22	Copper?, Gold?
56	Unknown	7S 37E 30	Gold?
57	C & H #4	7S 40E 30	Copper
58	Alum Canyon Prospect	8S 40E 5	Tungsten
59	Clalmar #5	8S 40E 6	Lead, Gold
60	Unknown	7S 39E 35	Gold
61	Milovitch #1	8S 39E 2	Gold
62	Milovitch Prospect	8S 39E 2	Gold
63	Bunker Hill (Milovitch)	8S 39E 1	Gold
64	Unknown	8S 39E 11	Mercury?
91	M & W #1	8S 39E 25	Mercury
92	Tiki #6	8S 39E 26	Sulfur
93	Texas American #67-65	8S 39E 26	Sulfur
94	El Dorado Lode #6	8S 39E 35	Sulfur
95	Big El Dorado	8S 39E 35	Sulfur
96	Crater Mine	8S 39E 33	Sulfur
96A	Crater #1	8S 39E 33	Sulfur
97	Fraction and Southwest Sulphur Group	8S 39E 33	Sulfur
98	Gulch Group	8S 39E 33	Sulfur
99	Solis & Ferris	8S 39E 33	Sulphur
100	Unknown	8S 39E 33	Sulphur
101	Widder #5	8S 39E 33	Sulfur, Mercury,
102	Christopher #2 Prospect	8S 39E 33	Mercury(?)
103	Alone Prospect	8S 39E 33	Mercury
104	Rebecca #4	9S 39E 4	Mercury, Gold
105	Rebecca #2	9S 39E 4	Mercury, Gold
106	Lucky 13	8S 39E 31	Mercury
107	Up & Down Mine	9S 39E 9	Mercury, Gold, Silver
108	Up and Down #1-6	9S 39E 9	Mercury, Gold(?)
109	Mercury Knob Prospect	9S 39E 9	Mercury, Copper, Turquoise
110	Eureka Prospect (Bear Cat)	9S 39E 10	Mercury, Gold
111	Sulphur Queen	8S 39E 10	Sulfur
112	April Fool Prospect	9S 39E 9	Mercury
113	Storm Cloud	9S 39E 16	Mercury, Gold
114	Sally Joe Eureka Sulfur	9S 39E 17	Sulfur, Mercury
115	Silver Mine (Silver Bowl)	9S 41E 1	Silver, Gold
116	Black Rock Prospect	7S 37E 23	Copper, Gold, Silver
117	Walker Prospect	9S 36E 25	Talc
118	Try again	9S 36E 36	Talc?, Limestone
119	Try again	9S 36E 36	Talc?, Limestone
120	Coyote Mystery, Rainbow	9S 37E 31	Gold, Copper, Tungsten
121	Marble Canyon Placers	10S 37E 7,8, 9,10	Gold
122	Silver Spur (Detry Mine) (Bedell Mine)	10S 37E 13,24	Lead, Gold, Zinc
123	Opal Mine	10S 37E 24	Lead, Silver, Zinc
124	Opportunity Prospect	10S 37E 20	Gold(?)
125	Fuller Prospect	10S 37E 30	Gold(?)
126	Lee Prospect (Lucky Mike?)	10S 37E 30	Silver, Lead, Copper
127	Gingerbell "Apex" Prospect	10S 37E 29	Lead, Zinc, Silver(?)
128	August Prospect (Whippoorwill #1)	10S 37E 32	Silver, Lead, Copper, Zinc
129	Ruby Fort	10S 37E 32	Silver, Lead, Copper
130	Del #1 (Bonnie, Newcastle Prospect)	10S 37E 31	Copper, Gold, Silver, Zinc
131	Hillside Prospect	10S 37E 23	Lead, Silver
132	Emma (Hillside #1) Prospect	11S 37E 4	Lead, Silver
133	Morning Star (Pine Tree Mine)	11S 37E 7	Lead, Silver
134	Desert View Prospect	10S 38E 3	Copper
135	Lithium Occurrence	9S 39E 34	Lithium
136	Titan Placer	10S 39E 1, 12, 13	Sand
137	Lerh-Vanerrr Prospect	11S 40E 6	Gold
138	Jenny B.	11S 40E 1	Gold, Silver, Copper
139	Unknown	8S 39E 2	Mercury?
140	Unknown	8S 39E 11	Mercury, Limestone?
141	Juanita Claim	10S 42E 6,7, 18	Gold
142	Six Pac	4S 35E 11	Gold
143	Jeff #2	4S 35E 14	Gold
144	Unknown	5S 36E 22	Gold
145	Unknown	5S 36E 15	Silver, Lead, Gold
146	Astro #1	5S 36E 24	Gold
147	Unknown	5S 36E 24	Gold
148	[illegible]	5S 36E 28	Silver, Gold

Deposits Formed by Contact Metasomatism (Skarns)

MRZ-1(s): Areas where geologic information indicates there is little likelihood for the presence of significant contact metasomatic deposits.

MRZ-2a(s): Areas containing metallic ore deposits of contact metasomatic origin where geologic data indicate that significant inferred reserves are present.

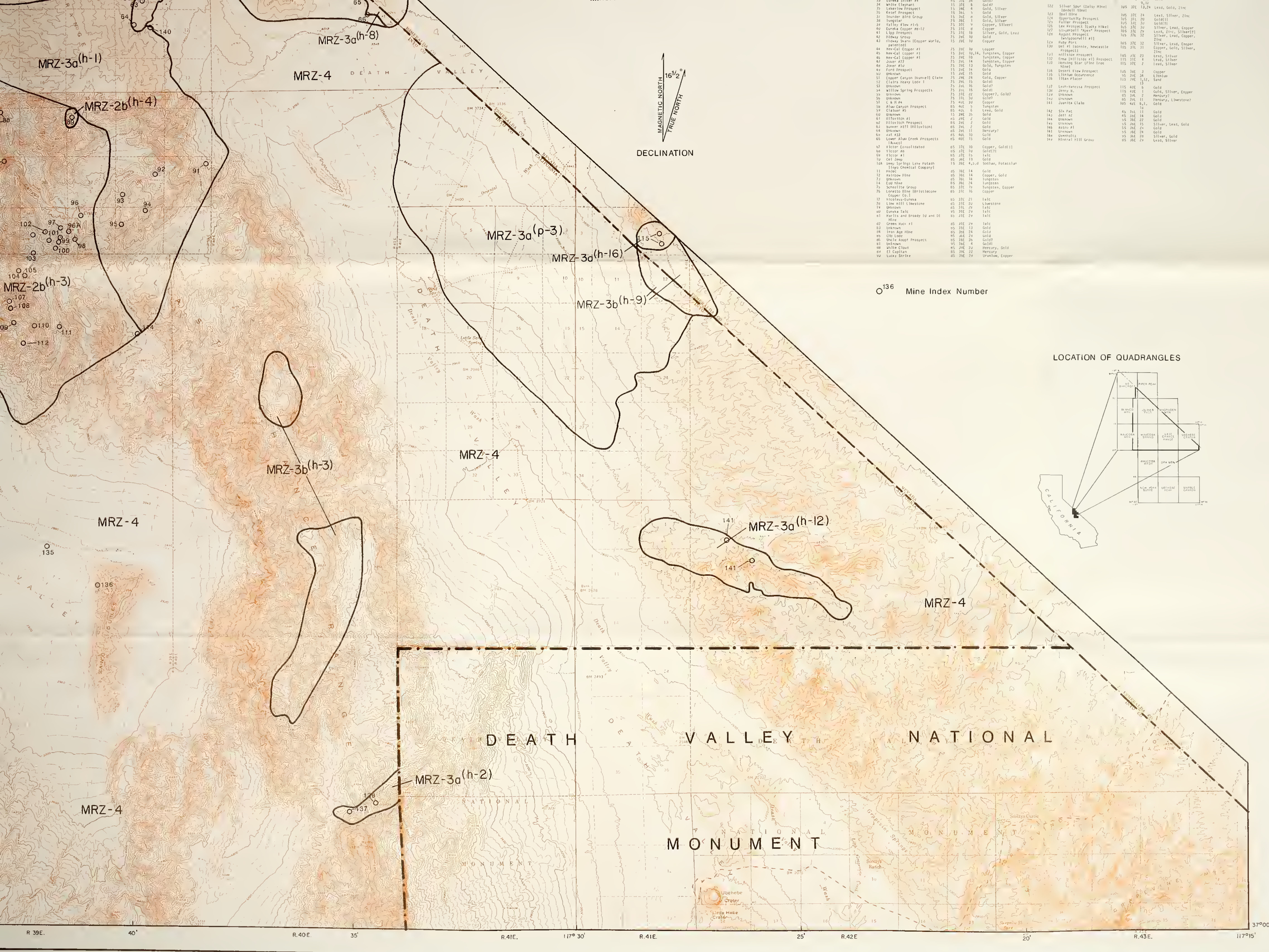
MRZ-2b(s): Areas containing metallic ore deposits of contact metasomatic origin where geologic information indicates that significant inferred resources are present.

MRZ-3a(s): Areas that fall within the contact aureole of plutonic rock masses within which undiscovered metallic deposits of contact metasomatic origin similar to known deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance.

MRZ-3b(s): Areas that contain undiscovered metallic resources of contact metasomatic origin that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not

MRZ-4(s): been made or in types of deposits as yet unrecognized for their economic potential

Topographic Base by U.S. Geological Survey 5' 118°00' R.36E. R.37E. 55' 50' 117°45' R.39E. 40' R.40E. 35'



33	Eureka Silver #4	8S	37E	34	Gold?
34	White Elephant	7S	37E	6	Gold?
35	Lakeview Prospect	7S	36E	4	Gold, Silver
36	Kesef Prospect	7S	36E	5	Gold
37	Thunder Bird Group	7S	36E	8	Gold, Silver
38	Tungstar	7S	36E	1	Gold, Silver
39	Valley View #1-5	7S	37E	9	Copper, Silver(?)
40	Eureka Copper #8-12	7S	37E	8	Copper
41	Lipp Prospect	7S	37E	18	Silver, Gold, Lead
42	Midway Group	7S	39E	10	Gold
43	Midway Skarn (Copper World, patented)	7S	39E	10	Copper
44	Nev-Cal Copper #1	7S	39E	10	Copper
45	Nev-Cal Copper #1	7S	39E	10,14,	Tungsten, Copper
46	Nev-Cal Copper #1	7S	39E	10	Tungsten, Copper
47	Joker #77	7S	39E	14	Tungsten, Copper
48	Joker #10	7S	39E	13	Gold, Tungsten
49	Ford Prospect	7S	39E	14	Gold
50	Unknown	7S	39E	15	Gold
51	Copper Canyon (Kunzel) Claim	7S	39E	24	Gold, Copper
52	Claims Heavy Lode I	7S	39E	15	Gold(?)
53	Unknown	7S	39E	16	Gold?
54	Willow Spring Prospects	7S	39E	16	Gold(?)
55	Unknown	7S	39E	22	Copper?, Gold?
56	Unknown	7S	39E	30	Gold?
57	C & H #4	7S	40E	30	Copper
58	Alum Canyon Prospect	8S	40E	5	Tungsten
59	Claimar #5	8S	40E	6	Lead, Gold
60	Unknown	7S	39E	35	Gold
61	Millovitch #1	8S	39E	2	Gold
62	Millovitch Prospect	8S	39E	2	Gold
63	Bunker Hill (Millovitch)	8S	39E	2	Gold
64	Unknown	8S	39E	11	Mercury?
65	Rat #33	8S	40E	10	Gold
66	Lower Alum Creek Prospects (Auxco)	8S	40E	15	Gold
67	Victor Consolidated	8S	37E	10	Copper, Gold(?)
68	Victor #8	8S	37E	10	Gold(?)
69	Victor #1	8S	37E	15	Talc
70	Cel Jeep	8S	36E	11	Gold
70A	Deep Springs Lake Potash (Inyo Chemical Company)	7S	36E	4,5,8	Sodium, Potassium
71	HeJec	8S	36E	14	Gold
72	Rainbow Mine	8S	36E	14	Copper, Gold
73	Unknown	8S	36E	14	Tungsten
74	EoU Mine	8S	36E	24	Tungsten
75	Scheelite Group	8S	37E	19	Tungsten, Copper
76	Loretto Mine (Bristlecone Copper Co.)	8S	37E	16	Copper
77	Nicolaus-Eureka	8S	37E	21	Talc
78	Lime Hill Limestone	8S	37E	20	Limestone
79	Unknown	8S	37E	29	Talc
80	Eureka Talc	9S	37E	29	Talc
81	Harris and Broady (U and D) Mine	8S	37E	29	Talc
82	Green Rock #1	8S	37E	29	Talc
83	Unknown	8S	35E	13	Gold
84	Iron Age Mine	8S	35E	24	Gold
85	CIM Lode	8S	36E	29	Gold
86	Uncle Adopf Prospect	8S	36E	35	Gold?
87	Unknown	9S	36E	4	Gold(?)
88	White Cloud	8S	39E	20	Mercury, Gold
89	El Capitan	8S	39E	22	Mercury
90	Lucky Strike	8S	39E	29	Uranium, Copper

				9,10	
122	Silver Spur (Daisy Mine) (Bedell Mine)	10S	37E	13,24	Lead, Gold, Zinc
123	Opal Mine	10S	37E	24	Lead, Silver, Zinc
124	Opportunity Prospect	10S	37E	20	Gold(?)
125	Fuller Prospect	10S	37E	30	Gold(?)
126	Lee Prospect (Lucky Mike)	10S	37E	30	Silver, Lead, Copper
127	Gingerbell "Apex" Prospect	10S	37E	29	Lead, Zinc, Silver(?)
128	August Prospect (Whippoorwill #1)	10S	37E	32	Silver, Lead, Copper, Zinc
129	Ruby Port	10S	37E	32	Silver, Lead, Copper
130	Del #1 (Bonnie, Newcastle Prospect)	10S	37E	31	Copper, Gold, Silver, Zinc
131	Hillside Prospect	10S	37E	23	Lead, Silver
132	Emma (Hillside #1) Prospect	11S	37E	4	Lead, Silver
133	Morning Star (Pine Tree Mine)	11S	37E	2	Lead, Silver
134	Desert View Prospect	10S	38E	3	Copper
135	Lithium Occurrence	9S	39E	34	Lithium
136	Titan Placer	10S	39E	1,12,13	Sand
137	Leah-Vanessa Prospect	11S	40E	6	Gold
138	Jenny B.	11S	40E	1	Gold, Silver, Copper
139	Unknown	8S	39E	2	Mercury?
140	Unknown	8S	39E	11	Mercury, Limestone?
141	Juanita Claim	10S	42E	6,7,18	Gold
142	Six Pac	4S	35E	11	Gold
143	Jeff #2	4S	35E	14	Gold
144	Unknown	5S	36E	22	Gold
145	Unknown	5S	36E	15	Silver, Lead, Gold
146	Astro #1	5S	36E	24	Gold
147	Unknown	5S	36E	24	Gold
148	Overholtz	9S	36E	28	Silver, Gold
149	Mineral Hill Group	8S	36E	29	Lead, Silver

O[136] Mine Index Number

origin similar to known deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance.

MRZ-3b(a): Areas that contain undiscovered metallic resources of contact metasomatic origin that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not

MRZ-4(a): been made or in types of deposits as yet unrecognized for their economic potential (speculative resources).

Areas where geologic information does not rule out the presence or absence of deposits formed by contact metasomatism.

Deposits Formed by Hydrothermal Processes

MRZ-1(h): Areas where geologic information indicates there is little likelihood that hydrothermal mineral deposits of significance are present.

MRZ-2a(h): Areas containing hydrothermal ore deposits where geologic data indicates significant measured or indicated reserves are present.

MRZ-2b(h): Areas containing hydrothermal ore deposits where geologic information indicates that significant inferred resources are present.

MRZ-3a(h): Areas underlain by geologic terranes within which undiscovered metallic deposits similar to known hydrothermal deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance.

MRZ-3b(h): Areas that may contain undiscovered metallic resources of hydrotherami origin that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not been made, or in types of deposits as yet unrecognized for their mineral potential (speculative resources).

MRZ-4(h): Areas where available information does not rule out the presence or absence of hydrothermal mineral deposits.

Placer Deposits

MRZ-1(p): Areas where geologic information indicates there is little likelihood for the presence of significant placer deposits.

MRZ-2a(p): Areas containing alluvial deposits where geologic information indicates significant measured or indicated placer mineral reserves are present.

MRZ-2b(p): Areas containing alluvial deposits where geologic information indicates that significant inferred placer mineral resources are present.

MRZ-3a(p): Areas underlain by alluvial deposits within which undiscovered placer mineral deposits similar to known placer deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance.

MRZ-3b(p): Areas that may contain undiscovered placer mineral resources that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not been made, or in types of deposits as yet unrecognized for their economic potential (speculative resources).

MRZ-4(p): Areas where geologic information does not rule out the presence or absence of placer deposits.

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA-PETE WILSON, GOVERNOR
THE RESOURCES AGENCY-DOUGLAS P. WHEELER, SECRETARY FOR RESOURCES
DEPARTMENT OF CONSERVATION-EDWARD G. HEIDIG, DIRECTOR

MINERAL LAND CLASSIFICATION MAP SOUTH HALF OF THE EUREKA–SALINE VALLEY SMARA STUDY AREA

Includes

Dry Mountain, Marble Canyon, New York Butte, Ubehebe Peak and Waucoba Wash 15-Minute Quadrangles, Inyo County, California

Areas Classified for Deposits Formed by Hydrothermal, Contact Metasomatic, and Placer Processes

By
Gary C. Taylor and Stephen E. Joseph

1987

SCALE 1:62,500

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

Placer Deposits

MRZ-1(p): Areas where geologic information indicates there is little likelihood for the presence of significant placer deposits.

MRZ-2a(p): Areas containing alluvial deposits where geologic information indicates significant measured or indicated placer mineral reserves are present.

MRZ-2b(p): Areas containing alluvial deposits where geologic information indicates that significant inferred placer mineral resources are present.

MRZ-3a(p): Areas underlain by alluvial deposits within which undiscovered placer mineral deposits similar to known placer deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance.

MRZ-3b(p): Areas that may contain undiscovered placer mineral resources that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not been made, or in types of deposits as yet unrecognized for their economic potential (speculative resources).

MRZ-4(p): Areas where geologic information does not rule out the presence or absence of placer deposits.

Deposits Formed by Contact Metasomatism (Skarn)

MRZ-1(s): Areas where geologic information indicates there is little likelihood for the presence of significant contact metasomatic deposits.

MRZ-2a(s): Areas containing metallic ore deposits of contact metasomatic origin where geologic data indicate that significant inferred reserves are present.

MRZ-2b(s): Areas containing metallic ore deposits of contact metasomatic origin where geologic information indicates that significant inferred reserves are present.

MRZ-3a(s): Areas that fall within the contact aureole of plutonic rock masses within which undiscovered metallic deposits of contact metasomatic origin similar to known deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance.

MRZ-3b(s): Areas that contain undiscovered metallic resources of contact metasomatic origin that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not been made or in types of deposits as yet unrecognized for their economic potential (speculative resources).

MRZ-4(s): Areas where geologic information does not rule out the presence or absence of deposits formed by contact metasomatism.

MINE, LOCATION AND COMMODITY INDEX

MINE #	MINE NAME	LOCATION			COMMODITIES
150	Waucoba Tungsten Mine	11S	37E	21	Tungsten, Copper
151	Buckwheat #1-5	11S	37E	26	Tungsten
152	Saline Valley Quartz	11S	37E	28	Quartz
153	Emma #1-9	12S	37E	4	Lead, Silver(?)
154	Lucky Josephine #11 & 17	12S	37E	9	Lead, Silver
155	Sunset Hill Mine	12S	37E	9	Lead-Silver
156	Blue Monster Mine	12S	37E	20	Lead, Silver
157	Willow Creek Mine	13S	37E	12	Talc
158	White Eagle Mine	13S	37E	1	Talc
159	Grey Eagle (Eleanor)	13S	37E	10	Talc
160	Corris Gee Talc Mine	13S	37E	14	Talc
161	Saline Valley Sand Dunes	13S	38E	33,32, 34	Sand
162	Snowflake Talc Mine	14S	38E	16	Talc
163	Saline Valley Borax	14S	38E	22	Boron
164	Saline Valley Salt	14S	38E	26	Sodium
165	Big Silver	14S	38E	34	Silver
166	Black Diamond Prospect	13S	39E	4	Manganese, Tungsten
167	Coffee Stop Prospect	13S	39E	33	Mercury
168	Ostrander Pozzolan (White Cliffs)	11S	39E	7	Pozzolan
169	Lucky Rich Prospect	13S	39E	12	Copper
170	Blue Jay (Jarosite)	14S	40E	27	Copper, Molybdenum
171	Bonanza Prospect (Yankee Clipper)	15S	40E	10	Copper, Silver, Gold, Tungsten, Uranium
172	Lead King Group (Lippincott)	15S	40E	24	Lead, Silver, Copper, Molybdenum
173	Hidden Lode Prospect	15S	41E	19	Copper, Lead, Silver
174	Unknown	15S	40E	25	Silver
175	Green Light Prospect	15S	40E	31	Silver
176	Windy Hill Prospect	15S	40E	31	Silver
177	Sunshine Prospect	15S	40E	31	Silver, Lead, Tungsten
178	Cupro Tungstite Prospect	15S	41E	30	Copper, Tungsten, Silver, Gold
179	Sol (see Lu Tel) Group	15S	40E	35	Copper, Silver, Gold, Tungsten
180	Shirley Ann (Eureka)	16S	40E	1	Copper, Silver, Lead, Gold, Tungsten, Molybdenum
181	Navajo Chief Prospect	16S	40E	1	Copper, Lead, Silver, Gold
182	Jack Rabbit Prospect	16S	40E	1	Copper, Tungsten
183	Tungstaline Prospect (Twin Sisters)	15S	41E	16	Silver, Copper, Tungsten
184	Monarch Mine	15S	41E	35	Gold, Silver, Tungsten
185	Unknown	15S	41E	33	Gold?
186	Tourmaline #1-4	16S	41E	4	Tourmaline, Copper
187	Green Quartz (Hourglass) Claim	16S	41E	21	Copper
188	J.O. Mine (Calmet Group)	15S	41E	20	
189	Palmer Prospect	15S	41E	20	Copper
190	Copper Queen-Lucky Boy	15S	40E	17	Copper
191	Cerrusite Mine	16S	40E	7	Lead, Silver
192	Platon Extension (Birdspring Garnet)	16S	40E	7	Lead, Silver, Copper
193	May B Prospect	16S	40E	6	Lead, Silver, Copper
194	Anton & Foust Mine (Birdspring Garnet)	16S	40E	5	Copper
195	Unknown	16S	40E	18	Lead, Silver
196	American Prospect	15S	39E	30	Silver
197	American Flag Mine	15S	38E	9	Gold, Silver, Copper
198	Prospect 77	15S	38E	9	Silver, Gold, Copper, Lead
199	Trepler Mine	15S	38E	1	Gold, Silver, Lead
200	Prospect No. 76	15S	38E	16	Gold
201	Craig Canyon	15S	38E	7	
202	Hunter Arrastras	14S	38E	31	Gold, Silver, Copper, Lead
203	Loadstar Prospect	15S	38E	6	Copper
204	Gold Standard Mine	14S	38E	32	Silver, Gold, Copper
205	Spring Mine	14S	38E	29	Gold
206	Prospect No. 42	14S	38E	30	Gold
207	Bighorn Mine area	14S	37E	36	Gold, Silver, Copper, Lead
208	Llano (de) Oro Prospect	14S	37E	35	Copper
209	Garrison Mine area	14S	37E	36	Gold
210	Burgess Mine area	15S	37E	13	Silver, Lead, Zinc, Gold
211	Prospect No. 77	15S	37E	12	Silver, Gold, Copper
212	Beveridge Canyon (W No. 26 Prospect)	14S	37E	35	Gold
213	Beveridge Canyon #4 Prospect	14S	37E	26	Gold
214	Horseshoe Mine	14S	37E	26	Gold, Silver, Copper
215	Beveridge Canyon #4 No. 28	14S	37E	26	Gold


MRZ-3b(h-6)
MRZ-4
MRZ-2b(h-1)
MRZ-3a(s-8)
MRZ-3a(p-2)
MRZ-3b(h-2,s-1)
MRZ-3a(s-4)
MRZ-2b(h-1)
MRZ-4
MRZ-3a(s-4)
MRZ-4
MRZ-3a(s-4)
MRZ-3a(s-4)
MRZ-2b(h-1)
MRZ-3a(s-6)
MRZ-4
MRZ-3a(h-7)
MRZ-3a(h-9)
MRZ-2b(h-2)
Mines and prospects on the west slope of the Inyo Mountains were not examined or classified in this study.
OWENS LAKE
Topographic base by U.S. Geological Survey.
MRZ-2b(p): Areas containing alluvial deposits where geologic information indicates that significant inferred placer mineral resources are present.
MRZ-3a(p): Areas underlain by alluvial deposits within which undiscovered placer mineral deposits similar to known placer deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance.
MRZ-3b(p): Areas that may contain undiscovered placer mineral resources that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not been made, or in types of deposits as yet unrecognized for their economic potential (speculative resources).
MRZ-4(p): Areas where geologic information does not rule out the presence or absence of placer deposits.
MRZ-2b(s): Areas containing metallic ore deposits of contact metasomatic origin where geologic information indicates that significant inferred reserves are present.
MRZ-3a(s): Areas that fall within the contact aureole of plutonic rock masses within which undiscovered metallic deposits of contact metasomatic origin similar to known deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance.
MRZ-3b(s): Areas that contain undiscovered metallic resources of contact metasomatic origin that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not been made or in types of deposits as yet unrecognized for their economic potential (speculative resources).
MRZ-4(s): Areas where geologic information does not rule out the presence or absence of deposits formed by contact metasomatism.
Deposits Formed by Hydrothermal Processes
MRZ-1(h): Areas where geologic information indicates there is little likelihood that hydrothermal mineral deposits of significance are present.
MRZ-2a(h): Areas containing hydrothermal ore deposits where geologic data indicates significant measured or indicated reserves are present.
MRZ-2b(h): Areas containing hydrothermal ore deposits where geologic information indicates that significant inferred resources are present.
MRZ-3a(h): Areas underlain by geologic terranes within which undiscovered metallic deposits similar to known hydrothermal deposits in the same producing district or region may be reasonably expected to exist (hypothetical resources). Such areas may include prospects of undetermined significance.
MRZ-3b(h): Areas that may contain undiscovered metallic resources of hydrotheraml origin that may occur either in known types of deposits in favorable geologic settings where mineral discoveries have not been made, or in types of deposits as yet unrecognized for their mineral potential (speculative resources).
MRZ-4(h): Areas where available information does not rule out the presence or absence of hydrothermal mineral deposits.
MRZ-3a(h-1)
Mineral Resource Zone Boundaries
MAGNETIC NORTH
TRUE NORTH
16°
DECLINATION
Mine Index Number
LOCATION OF QUADRANGLES
CALIFORNIA